



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-390/91-26 and 50-391/91-26

Licensee: Tennessee Valley Authority
6N11 B Missionary Place
1101 Market Street
Chattanooga, TN 37402-2801

Docket Nos.: 50-390 and 50-391 Licensee Nos.: CPPR-91 and CPPR-92

Facility Name: Watts Bar 1 and 2

Inspection Conducted: October 22 - November 15, 1991

Inspectors: *[Signature]*
G. A. Walton, Senior Resident Inspector
Construction

Dec 5, 1991
Date Signed

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Dec 5, 1991
Date Signed

SUMMARY

Scope:

This resident inspection was concentrated in two major areas: the first consisted of evaluation of items closed prior to 1985 to determine if a need exists to re-open any of the items based on findings from later inspections and the second area involved an evaluation of open items for closure and/or impact on construction restart.

Results:

Nine closed item reviews were performed and none were re-opened. This decision was based on the adequate closure of the issue at the time of its closure or the issue again appeared and was evaluated in a later inspection. Eighty-nine items were evaluated for closure or for recurrence controls for construction restart. Of these, thirteen were evaluated to be acceptable for closure and the remaining items were determined to have adequate controls in place to prevent their recurrence.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

D. Allen, Modifications Engineering Supervisor
J. Borum, Materials & Nuclear Stores Manager
R. Briggs, Principal Material Engineer
L. Bush, Operations Superintendent
W. Byrd, Senior Project Manager
S. Crowe, QC Manager
J. Cruise, Licensing Engineer
T. Dean, Licensing Engineer
*W. Elliott, Engineering Manager, Nuclear Engineering
*J. Garrity, Site Vice President, Watts Bar
T. Huth, Reactor Engineer
*L. Jackson, Operations Manager
R. Johnson, Modifications Manager
*N. Kazanas, Vice President, Completion Assurance
F. Koontz, Manager, Operations Engineering
D. Kulisek, Operations Support Manager
L. Martin, Site Quality Manager
L. McCormick, NSSS System Engineering Supervisor
A. McLemore, Modifications Engineering Manager
C. Nelson, Maintenance Support Superintendent
P. Pace, Compliance Licensing Supervisor
*G. Pannell, Site Licensing Manager
*R. Purcell, Plant Program Manager
*A. Reynolds, QC Manager, SWEC
A. Roberts, Materials Manager
K. Stinson, Project Manager, TVA PM
S. Tanner, Special Projects Manager
*E. Wallace, Manager, NLRA
*H. Weber, Engineering and Modifications Manager
P. Wilson, Special Projects Manager

Other licensee employees contacted included engineers, technicians, nuclear power supervisors, and construction supervisors.

* Attended exit interview

Acronyms used throughout this report are listed in the last paragraph of this report.

2. Closed Item Reviews

The inspector selected nine closed inspection items for evaluation to assure the items were properly closed and that later activities or

findings had not changed the "closed" status. The selection included items closed prior to 1985 and covered several different disciplines and subjects. The criteria applied to determine acceptance of the "closed" status or the need to re-open the item for further actions was based on the following:

- Was the item properly closed in the inspection report?
- Are the details provided in the report sufficient?
- Have later findings or modifications caused the "closed" status to be incorrect?

The items reviewed during this reporting period are listed below.

- a. LII 78-11-07, Electrical Cable for Use Inside Containment, NCR/QEB 78-2

This issue was identified on January 17, 1978. Electrical cables procured for use inside containment and supplied by Rockbestos Company did not meet the aging criteria based on what was later determined to be inadequate testing. Retesting was performed utilizing appropriate methods and standards which demonstrated that the cables, even with less than average insulation thickness, meet acceptable criteria for use in containment.

This issue was closed in NRC IR 40-390/78-17 and the closure appears adequate.

- b. LII 78-11-05, 50.55(e), Containment Vessel Penetration Sleeves Out of Tolerance - NCR 1047R

The licensee determined that the bellows assemblies which connect to main steam and feedwater lines at the containment vessel annulus were different than that specified for the inside pipe diameters and weld preparation thickness. Based on discussions with the manufacturer, the licensee learned that a maximum diametrical expansion of five percent was possible for the nozzle nipple. The licensee had calculated design values of 0.6 percent before welding the penetration sleeves and bellows would meet the required alignment tolerances. The process utilized by the licensee would produce tolerances identical to the original theoretical weld.

This item was closed in NRC IR 50-390/78-11 based on the licensee's calculations. This closure appears adequate.

- c. LII 390/78-11-08, 50.55(e), Faulty Cable Tray Support Installation - NCR CAQ E-5

The issue arose from a claim that self-drilling expansion anchors utilized to attach cable tray hanger plates to concrete were improperly installed. The cause was attributed to improper expansion anchor bolt alignment to the hole pattern in the mounting plates and therefore damaging force was utilized to mate the bolts with the plate.

This issue was evaluated and closed in NRC IR 390/78-30. The closure was based on an engineering evaluation that determined the condition to be acceptable based on a percentage of bolts required to attach the plate securely. This closure appears adequate.

- d. UNR 390/80-10-01, Assurance That Nonconforming Conditions Identified at Other TVA Sites are Corrected for Watts Bar

This issue involved a lack of generic evaluations for nonconforming conditions identified at one of the licensee's nuclear plants to be performed at its other nuclear facilities. The importance of this requirement arose out of the commonality in the areas of management, programs, procedures, contractors, and examining personnel. This issue specifically evolved from earlier inspections at the Sequoyah Nuclear Plant which identified nonconformances that were common to the Watts Bar Facility but was not evaluated for the Watts Bar Plant.

This item was evaluated and closed in IR 50-390/81-06 based on the licensee's revision of the operational Quality Assurance Manual to require that NCO Metallurgy and Standards Group evaluate PSI and ISI program deficiencies identified at a particular plant for impact on other plant PSI and ISI programs. This closure appeared limited to a small area associated with generic evaluations of nonconforming conditions. In addition, later inspections identified nonconforming conditions that were not evaluated for generic implications. The following listing of inspection reports identified the failure to perform generic reviews of conditions adverse to quality reports:

- (1) IR 50-390, 391/88-01
- (2) IR 50-390, 391/88-02
- (3) IR 50-390, 391/90-31

It has been determined that the subject item need not be re-opened since the issue has been re-identified in later inspections and each item was evaluated.

- e. URI 80-36-02, Reporting of Raw Water System Corrosion

This issue referenced the licensee's study which predicted that numerous subloop cooling of safety-related components would become constricted during design lifetime due to MIC. The issue was again reviewed in IR 50-390/82-24 and open item URI-80-36-02 was closed based on the licensee's issuance of a Construction Deviation Report,

10 CFR 50.55(e) in January 1981 and NCR 2849. However, these deficiency reports only addressed piping on the ERCW pumps and did not consider other piping associated with the subloop cooling of other equipment.

Based on these problems, the licensee has implemented a program to evaluate the areas identified. This program has been reviewed and evaluated by the NRC and a SER issued, Safety Evaluation of the MIC Special Program, (TAC No. 63650), dated September 13, 1991.

It appears that the issue was not fully addressed in the licensee's deficiency reports and therefore closure based on these reports may have been less than adequate. However, based on the issue addressed in later inspections (i.e., 50-390, 391/87-12 and the SER referenced above) this original item will not be re-opened.

- f. VIO 50-390/81-14-08, Failure to Assure Only Controlled Drawings are Utilized for Safety Related Activities

The inspector had identified that the drawing files maintained in the control room were not kept up-to-date with the latest revisions. It was further determined that Standard Practice WB 3.29 did not contain provisions to assure that only controlled drawings were to be utilized for safety-related activities.

A follow-up inspection, IR 50-390/82-12, was performed which revealed that the licensee had taken corrective actions and the drawing file included the required drawings with the latest revisions and that the instruction utilized to control drawings was revised to establish adequate drawing controls. Based on the results of this inspection, the issue was closed.

The closure of the original issue appeared adequate, but the drawing control problem arose again in 1991 and a violation, 50-390/91-18-05, was issued. This violation identified that drawings were not controlled as required. However, the breakdown was determined to result primarily from a failure to follow the applicable procedures.

- g. LII 80-03-03, Tuf-Loc Bearings in GE Circuit Breakers

This issue originated in 1979 from a GE Service Advice Letter that identified some applications of Tuf-Loc sleeve bearings in certain GE circuit breakers should be upgraded to aluminum-bronze sleeve bearings to ensure a design service life of 10,000 cycles. Upon verifying applicability to the Watts Bar Nuclear Plant, the licensee reported the condition to the NRC in accordance with 10 CFR 50.55(e). In the final report to the NRC dated February 7, 1980, the licensee committed to replacing all the Tuf-Loc sleeve bearings in GE circuit breakers with the aluminum-bronze sleeves in the operating mechanisms. Approximately 190 circuit breakers, 68 of which were

used in Class 1E applications, were sent to GE under contract to replace all the Tuf-Loc sleeve bearings.

The documentation from the licensee's efforts to evaluate and correct the bearing problem was reviewed by an NRC inspector and the issue was closed based on this review. However, the licensee reported again in 1991 that Tuf-Loc sleeve bearings were found in three of those that were returned to GE for replacement and the condition was documented on a SCAR, CHSCA 910002, which required corrective actions and generic evaluation. In addition, it was reported that one breaker had been found with the Tuf-Loc bearings that had not been replaced earlier. The reviews determined that the Tuf-Loc bearings were not replaced by GE. In conversations with GE, it was reported that at the time these bearings were to be changed out GE was in the process of phasing out operations at the Philadelphia, Pennsylvania, facilities and that may have contributed to the deterioration in the quality of the GE workmanship and allowing for some bearings not being changed out as required. GE assured that an improved quality program has been implemented at their Chamblee, Georgia, facility which requires the disassembly, repair/overhaul, and reassembly of circuit breakers be documented on approved instructions.

The corrective actions involved a documented statement from GE stating that the Tuf-Loc bearings are satisfactory for a minimum of 2000 cycles of operation. As a result, the licensee has implemented a requirement to change out the Tuf-Loc bearings prior to 1800 cycles. MI-57.1, 6900 Volt Circuit Breaker Inspection, has been revised to implement this requirement and to record and track the number of cycle operations of the breakers.

Although the closure of this issue was done without completing the corrective actions, the licensee had relied upon vendor documentation for final closure and this documentation should have been credible and sufficient for closing the issue. However, the licensee has since inspected breakers during the performance of the five year preventative maintenance program and reported deficiencies noted.

The item has been re-opened by the licensee under a later deficiency report and will be evaluated by the NRC prior to closure. No further review of the initial report will be required.

h. LII 80-24-03, Environmental Qualification of Class 1E Equipment

The licensee had identified that the required documentation to verify environmental qualification of several items of Class 1E equipment was not available and stated that this issue would be evaluated and a written report submitted. A final report submitted by the licensee had concluded that the missing documentation was not reportable. The inspector had reviewed this report and determined that the evaluation

and conclusion by the licensee was acceptable and the issue was closed in IR 50-390/81-10.

The closure appeared inadequate based on the brief description of the issue and the information that was documented in the closure. However, the environmental qualification of various equipment items has since been identified and the licensee has submitted a CAP to the NRC to address this issue. Based on this licensee's commitment to review and evaluate equipment for environmental qualification and the requirement for the NRC acceptance of the program, this item need not be re-opened.

i. LII 81-04-03, Unacceptable Welds on Duct Supports in the Auxiliary Building, NCR-2654R

The licensee reported that unacceptable welds were discovered on the duct supports in the auxiliary building. The report stated that a random inspection of 245 welds on duct supports in the auxiliary building, approximately 22 percent, were determined to be unacceptable. The defects included undersized welds, incomplete welds, slag inclusions, porosity, and overlap.

The inspector reviewed the licensee's final revised report, NCR 2654R, which stated that the licensee had re-evaluated the deficiency and, as a result, an alternate criteria was established for the visual inspection of fillet welds instead of the requirements of AWS D1.1. A comprehensive weld sampling program for all previously installed duct supports was implemented and the results from the samples evaluated were determined to be acceptable to ensure structural integrity and meet the requirements of the AISC Specification for design, fabrication, and erection of structural steel. The licensee further stated that the FSAR had been changed to reflect the change in inspection criteria for HVAC supports and the NRC inspector closed the issue after reviewing the licensee's reports and a partial inspection of five hangers that were documented in the report, IR 50-390/83-25.

The hanger support issue again resurfaced during the EG&G reviews of welding at WBN as documented in IR 50-390/89-04. A reinspection of 3046 welds was performed and only minor problems were found to exist with 4 of these which resulted in the licensee issuing a CAQR to resolve the issue.

A SER titled Safety Evaluation of the Watts Bar Plan For Safety-Related Heating, Ventilation and Air Conditioning Duct and Duct Supports (TAC No. R00510) was issued by the NRC dated October 24, 1989, which determined the licensee's planned corrective actions will resolve the outstanding issues associated with support of safety-related duct.

The subject item will remain closed based on a commitment for the licensee to evaluate and correct deficiencies and the requirement for the NRC to evaluate these corrections as required for closure of the SSER.

3. Action on Previous Inspection Findings (92701)

The following items were reviewed and evaluated for closure and for recurrence control. The items evaluated for closure are those where the corrective actions have been identified and have been completed. However, some items have corrective actions that have not been completed but controls have been implemented to prevent repeat deficiencies. Those items were evaluated for recurrence control for construction restart activities. For those items where the licensee has completed the required actions, the item was evaluated for closure.

a. (Open) CDR 390/85-59, 391/85-55, Flooding in Category I Structures Outside Containment

This 50.55(e) report involved the discovery that the environmental qualification for equipment located in Category I structures outside containment may not have adequately evaluated for the effects of flooding due to HELB and MELB.

To address this deficiency the licensee has instituted the following corrective measures:

- In September 1986 the EQP completed development of the formal EQ program. Included within this program was the requirement to address submergence of equipment within the scope of 10 CFR 50.49. The overall adequacy of the licensee's EQ program will be assessed during future NRC inspections.
- AI-1.38, Detail Site Integrated Schedules, was instituted in August 1988 to ensure that required activities and tasks are adequately scheduled, assigned, and tracked to completion to preclude future design oversights.
- HELB flood levels (Drawing Series 47E235) have been calculated and all 10 CFR 50.49 equipment has been evaluated for submergence due to HELB. This evaluation resulted in the discovery of several cables located below flood level. Calculation WBPEVAR9012004 has been issued to address and disposition these cables.
- The MELB evaluation was not complete during the reporting period. However, calculation WBN-OSG4-103, which was part of the MELB evaluation, identified a need to install flood curbs in the diesel generator building and WP-K-P06289A-01 was issued to cover the required work.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of identified equipment/structure modifications that will be required.

b. (Open) URI 390/89-07-03, Electrical Cable Separation Deficiencies

This item involved five examples of questions concerning electrical cable separation identified by NRC inspectors in May and June 1989. Each of these five examples are discussed below.

Example 1: Two instances were observed where cable tray covers did not extend the required three feet beyond the crossover point between two redundant division trays. The licensee subsequently issued CAQR WBP 890286 to document these deficiencies and is being tracked as part of the CAP. DCN M-14237-A has been initiated to provide for the installation of the required covers and/or barriers. In order to ensure that this does not represent a widespread condition, DCN M-05480-A, in accordance with PER WBP900304PER, is in preparation and will require engineering evaluation of additional raceways for similar configurations.

The inspector reviewed the above actions and determined those proposed relative to recurrence controls were adequate for construction restart. However, this example will remain open pending completion of the remaining work.

Example 2: This example identified the lack of a defined requirement for enclosed cable tray crossings of different divisions separated by a vertical distance greater than 12 inches but less than five feet. This issue is also being addressed by PER WBP900304PER and DCN M-05480-A which commits to add and/or revise notes on design output drawings to more clearly define separation requirements.

The inspector reviewed the above (yet to be issued) DCN and determined that its proposed corrective actions relative to recurrence control are adequate for construction restart. However, this example will remain open pending formal issuance and work completion associated with the DCN.

Example 3: This example identified a tray containing non-divisional cables that was routed in close proximity to two different trays containing cables of different divisions. The inspector reviewed FSAR Section 8.3.1.4.3 and SER (June

1982) Section 8.3.3.3 and determined that the above stated condition is consistent with these documents. This example is closed.

Example 4: This example questioned the practice of allowing one inch separation between totally covered trays of different divisions and the practice of measuring from tray bottom to tray bottom when trays within the same division are stacked vertically. The inspector reviewed FSAR Section 8.3.1.4.3 and SER (June 1982) Section 8.3.3.3 and determined that the above described practices were consistent with these documents. This example is closed.

Example 5: This example was that unsupported cables terminated at vital battery #1 could move during a seismic event to the extent that they could rub against a sharp surface and become damaged. The inspector, along with a licensee engineering representative, inspected the present configuration of the subject cables and determined that the closest surface with which any of these cables could come in contact was the smooth rounded plastic battery cell casing which could not exert enough stress to cause cable insulation damage during the relatively short duration of a seismic event. Therefore, this example is closed.

In summary, examples 1 and 2, although adequate for construction restart, will remain open pending completion of the stated actions.

- c. (Open) VIO 390/87-11-02, Failure to Control Lifted Cables and Wires Per Approved Procedures or Drawings

This item involved three examples of failure to adequately control the documentation/identification of spare and abandoned cables and lifted/unterminated wires, as follows:

- (1) Several abandoned and spared cables identified in the relay panels of the Unit 1 auxiliary instrument room were not being used and were not listed in the spare cable program.
- (2) Four unterminated wires (labeled F6-B2, F6-L2, F6-H2 and F6-E2) were identified inside panel 1-R-78. These wires were not shown on as-constructed drawing 45N1693-3, Connection Diagram for Panel 1-R-78 Revision 23LL and were not properly controlled as temporary alterations.
- (3) Cable 1-3PP-211-1101-B was installed as a three conductor cable but drawings 45W1677-5 and 45W1677-7 indicated that it was a two conductor cable.

The licensee has initiated specific and programmatic corrective actions to address the originally identified deficiencies, to

determine the extent of condition, to address any resultant deficiencies, and provide measures to prevent future recurrence. The original response to NOV dated October 16, 1987, (RIMS L44871016810), along with supplemental responses dated May 4, 1988, (RIMS L44880504808), August 29, 1988, (RIMS L44880829805), and March 2, 1990, (RIMS T03900302896) describe the licensee's commitments in these areas. However, as all field related activities have not yet been completed, the following discussion will be limited to the area of recurrence controls:

- As outlined in Volume 1 of the Nuclear Performance Plan (Revision 6, Page 147), the licensee will implement a new process for design change control. This new process will consolidate the old two-drawing system (as-designed versus as-constructed) into a single system in order to assure that drawings match plant configuration.
- SRN-46 to General Specification G-38, Installing Insulated Cables Up to 15,000 Volts, incorporated the following statement into section 3.4.1.6: "Abandoned/spare cables shall be identified and tagged in accordance with established plant procedures."
- Procedure MAI-3.3, Cable Terminating and Splicing for Cables Rated Up to 15,000 Volts, Revision 1, was implemented on October 17, 1991. This procedure superseded several previous construction and QC procedures and included the following requirements:
 - Section 6.2.13 provided identification and tagging requirements for spare and abandoned cables.
 - Data Sheet 1 and Appendix C provide the requirements for lifting and relanding previously installed cable/wire.
 - Data Sheet 2 and Appendix E provide the requirements for installing and identifying internal panel wiring and jumpers.
 - Data Sheet 7 and Appendix J provide the requirements for deleting or abandoning wiring and jumpers.
- Procedure AI-9.2.3, Maintenance Request Performance, Revision 2, included tagging and configuration requirements in Section 6.5.

The inspector reviewed the above actions pertaining to recurrence control and determined them adequate for construction restart. However, this item will remain open pending completion of all field related activities and subsequent NRC review.

d. (Open) CDR 390/89-07, Seismic Retention Clamp Bars for Safety Related Instrument Racks

This 50.55(e) report involved the discovery that seismic retention clamp bars were either missing or improperly installed in six vendor supplied instrument racks (rack numbers 1-R-127, -128, -130, -131, 1-L-11A, and 11B). The cause of this deficiency was a programmatic deficiency within the design change control process. The subject clamp bars were added via a vendor-initiated change to a vendor drawing and at that time no procedural requirement existed to initiate a field change for vendor-initiated changes even though the change required physical modification.

Licensee actions to address this deficiency were as follows:

- DCNs C-03053 and F-11225 were issued to provide design output and installation requirements for the fabrication and installation of the required clamp bars. The field work has not been performed.
- Requirements for the review of vendor supplied design information and initiation of appropriate output documents were implemented into procedures WBEP-3.17, Approving Vendor Information, Revision 0, and WBEP-5.12, Incorporation of Change Documents into Drawings, Revision 6, to ensure incorporation of vendor initiated changes.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the required field modifications.

e. (Open) CDR 390/89-01, Deficiency in the Design of the Emergency Gas Treatment System (EGTS)

This 50.55(e) report involved the discovery that, due to a design deficiency, a single failure of the auto path controls for the air cleanup subsystem of EGTS or a mechanical failure of the auto path dampers could prevent the automatic switch over to the standby exhaust path, resulting in the loss of annulus pressure control capabilities. The cause of this design deficiency was that this specific type of failure was not anticipated in the initial design.

To correct this deficiency, DCN P-03419-A was issued to add a time delay relay to back up the pressure switches that arm the transfer to the standby dampers. The field modifications required by this DCN have not yet been completed. Procedures NEP-5.2, Review, Revision 0, PM86-24, EEB Design Control, and PM87-27, Delegation of Signature Authority and Conduct of Specialists Reviews have been established to define the responsibilities and parameters for performing design reviews in the future.

The inspector reviewed the above actions and determined that the recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the hardware modifications.

- f. (Open) VIO 390/88-01-02, Cable Tray Installation
(Open) CDR 390, 391/89-06, Inadequate Qualification of Cable Tray Supports and Fittings

These items involved deficiencies in the design and installation of cable tray supports and cable tray connection fittings. The resolution of these issues were encompassed within the Cable Tray and Cable Tray Supports CAP, which included provisions for performing field walkdowns to determine the extent of condition, evaluation of specific and generic deficiencies discovered during the walkdowns, and any resultant corrective actions and/or hardware modifications. NRC review of licensee CAP is required for closure. Therefore, this item remains open but further action is not required prior to construction restart.

- g. (Closed) URI 390/90-12-01, Quality Of Site Approved Procedures

This item identified concerns pertaining to the useability of site procedures. These six concerns are discussed as follows:

- (1) Procedures AI-6.2, Preoperational Test Program, and AI-6.13, JTG Charter, contained conflicting requirements for the membership of the JTG. The licensee corrected this conflict by revising AI-6.2. The inspector reviewed the procedure and determined that the original concern was adequately resolved.
- (2) Procedures were found to contain references to superseded or deleted procedures. The licensee stated that when a procedure is cancelled or superseded, the procedure manual's table of contents and the procedure's final cover sheet/revision log are annotated to identify the procedure that replaces it. The inspector reviewed the tables of contents for several types of superseded procedures (e.g., CPI, GCI, QCP) and their final cover sheets and found that adequate information was provided to refer a user to the current appropriate procedure. This concern was adequately resolved.
- (3) This concern was that the same terms were not defined the same in different procedures. The licensee stated that, as provided in SSP-2.3, Administration of Site Procedures, Appendix B, Section 2.6.B, definitions stated in a procedure must be consistent with those used in higher-tier documents, but if a term was not defined in a higher-tier document it may be tailored to the activity or situation addressed in the lower-tier document. The inspector reviewed this position and determined that it was consistent with ANSI N45.2.10-1973, Quality Assurance Terms and Definitions, which allowed terms to

convey different intents as long as clarification was provided at the point of application (i.e., the lower-tier document). This concern is adequately resolved.

- (4) This concern was that construction procedure CPI-8.1.8-M-804D, Preservation (Electrical), referred to procedure GCI-8.1.05-01D, Temporary Features, for the requirements for desiccant accountability while procedure CPI-8.1.8-M-804E refers to procedure CEP-1.60-1, Temporary Features Accountability, for the same requirements. The inspector reviewed the above four procedures and found that all four have been superseded by procedures CAI-1.02, Preventative Maintenance for Non-Transferred Features (Unit 2), and CAI-1.03, Non-Transferred Temporary Features (Unit 2) which adequately resolve the concern.
- (5) This concern was that ACP-1.03, Preventative Maintenance Inspection Procedure, did not reference supporting documents located in the QCP-1.63 series of procedures. The inspector reviewed these procedures and found that each has been superseded by CAI-1.63 series of procedures. The inspector reviewed these procedures and found that they had been superseded by CAI-1.02 which adequately resolved the concern.
- (6) This concern was that use of the "action verb" format in the generation of administrative procedures could make use of the procedures extremely difficult and hard to implement. The inspector reviewed SSP-2.3, Administration of Site Procedures, Appendix B, Section 2.4.E, and found that although a narrative style is recommended when writing administrative procedures, the "action verb" style was an acceptable alternative if the preparer deems it more appropriate. This concern was adequately resolved.

The inspector reviewed the six concerns and determined that each was adequately resolved. Therefore, this item is closed.

- h. (Open) CDR 390/83-49, 391/83-47, Lugs Welded to Spiral Welded Pipe

This 50.55(e) report involved lugs that were welded directly to the spiral welded HVAC ducts and supports. During a seismic event the spiral welded duct which has a wall thickness of only .134 inches could become over stressed and tear, thus failing to maintain its pressure boundary integrity.

The licensee's original corrective action was to install a hoop ring around the duct at all typical type 47A055-80, -81, and -83 supports. The Unit 1 portion of this issue had previously been closed in IR 390/84-25. The inspector attempted to verify acceptable installation of the Unit 2 hoop rings through field inspection of selected supports. These inspections resulted in two items of concern. (1) Although the hoop rings were installed, the lugs were still welded to

both the duct and the supports. It was not clear whether the intent of the design, ECNs 4331 and 4567, was to remove the lug welds or leave them in place. (2) Note 5 on the above referenced drawing details required the hoop ring to be notched to avoid interference with the spiral weld as it passed the support. However, instead of notching the ring as required, the inspector observed that the spiral weld reinforcement had been ground flush with the pipe wall. When questioned about these concerns the licensee took the following actions:

- These concerns were determined to be also applicable to Unit 1, and as such, CDR 390/83-49 has been reopened to address them.
- PER WBP910371 (Unit 2) and PER WBP910372 (Unit 1) were issued to document the ground weld reinforcement.
- The root cause of this deficiency was determined to be failure of personnel to follow the design drawings. To preclude future similar recurrence, all craft and QC personnel were to be trained to restart training module CGG-302.001, Employee Responsibilities.
- As required by the CAP for HVAC duct and supports, all existing duct systems are to be reevaluated for compliance with Design Criteria WB-DC-40-31.8, Seismically Qualifying Round and Rectangular Duct. This reevaluation will determine whether the welded lugs can remain in place.
- The two above referenced PERs require a walkdown to be performed of all typical type 47A055-80, -81, and -83 supports to identify all spiral welds whose reinforcement was ground and subsequent engineering evaluations to determine appropriate corrective actions.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the referenced engineering evaluations and any resulting rework.

- i. (Closed) URI 390, 391/86-14-01, Review of EDG Logic Circuitry
(Open) CDR 390/86-50, 391/86-47, Standby D/G Design Deficiency

These items involved a DG design deficiency that if an emergency start signal were received during the normal DG shutdown cycle the engine idles down. The DG would accelerate to 900 rpm but the generator field would not flash, thus preventing the DG from accepting a load. This condition did not meet the requirements of Design Criteria WB-DC-40-28.1 or FSAR Section 8.3. This deficiency was determined to apply to all five DGs.

Based on subsequent discussions, the licensee agreed to perform a review of the DG logic circuitry, the preop test scoping document and

the preop test to determine the adequacy of the design and testing program. The above listed URI was opened to track the implementation of this review.

Actions taken by the licensee to address these issues were as follows:

- The cause of the original deficiency was determined to be a design error by the manufacturer, MKW Power Systems. The generator field flash reset circuit was interlocked with a relay contact (SS2X) which closes at approximately 200 rpm when engine speed is decreasing. Since this is below the 450 rpm idle speed, the field flash circuitry would not be reset. ECN 6262 and workplan E-6262-01 were subsequently issued to implement the following equipment modifications. Relay contact SS2X was jumpered from the reset function associated with relay "LR" and the voltage shutdown pushbutton was disconnected. This permits the reset signal to be independent of the engine speed. Although the field work associated with this modification has been performed, the licensee does not consider the workplan completed because it has not undergone its required safety net review.
- To prevent future recurrence of similar type design deficiencies, the manufacturer performed a secondary review of all safety related design changes in accordance with MWK EP-202, Design Review, Revision 6.
- The review of the diesel generator logic has been completed and vendor drawing discrepancies identified during this review were resolved under DCN S-16299-A.
- The preop test scoping document and preop test reviews have been completed. These reviews resulted in the issuance of revision 1 to preop test scoping document TVA-13B, Onsite AC Power Distribution System (Diesel Generator Loading Logic) and a new test scoping document TVA-73B, Onsite AC Power Distribution System (Additional Diesel Generator Loading Logic).

The inspector reviewed the above licensee actions and determined the following:

- Actions taken pertaining to the review of DG logic circuitry appear to be appropriate and comprehensive. Therefore, URI 390, 391/86-14-01 is administratively closed.
- Corrective actions pertaining to recurrence controls related to the identified design deficiency are adequate for construction restart. However, CDR 390/86-50 and CDR 391/86-47 will remain open pending the completion of the safety net review of workplan E-6262-01.

j. (Open) CDR 390/91-22, Deficiencies with HVAC Duct Supports

This 50.55(e) report identified various deficiencies in the installation of HVAC duct supports. Included were the types of deficiencies originally documented in VIO 390, 391/87-07-01, CAQR WBN870308, CAQR WBN870316, SCR W-580-PS, and NCR W-580-P.

The licensee determined the cause of these types of deficiencies resulted from inattention to detail along with specifications and instructions which were ambiguous and did not provide sufficient detailed guidance. In order to provide for more detailed guidance in the future, the licensee has issued General Engineering Specification G-89, Requirements for Structural and Miscellaneous Steel, Revision 0, dated December 10, 1990, and engineering specification N3C-942, Structural Requirements for HVAC Ducts and Duct Support, Revision 0, dated June 3, 1991.

The identification, evaluation, and any resulting hardware rework/modification will be accomplished in accordance with the CAP for HVAC duct and supports. The plan for accomplishing the HVAC CAP was submitted to NRC on November 18, 1988, (RIMS L44881118807) and approved by the staff via SER dated October 24, 1989.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of all activities encompassed with the HVAC CAP.

k. (Open) URI 390, 391/91-03-02, Applicability of Generic Reviews for WBN

This item involved a condition whereby a design deficiency discovered at SQN was not reviewed for generic applicability at WBN. The technical issue identified involved AFW system flow requirements and was covered by URI 390, 391/91-03-01. The programmatic deficiency which allowed the generic review to be bypassed is discussed below.

The licensee determined the cause of this deficiency was contained in Part I, Section 2.16, Appendix F, Note 1 of the NQAM, which stated (in part): "CAQRs related to performance of operating activities or operating procedures are not applicable to units still under the construction permit" This statement no longer exists in the licensee's quality program. The generic applicability sections of Nuclear Power Standard STD-3.4, Corrective Action, and WBN Site Standard Practice SSP-3.4, Corrective Action Program, provide more conservative guidelines for determining the types of items which require interplant applicability reviews.

The licensee is also evaluating CAQs from SQN and BFN which were generically reviewed during the period of time the above referenced statement was in the NQAM to ensure that appropriate interplant

applicability has been determined. This evaluation has not been completed.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence control were adequate for construction restart. However, this item will remain open pending completion of the above generic applicability evaluation.

1. (Open) URI 390, 391/90-19-03, Implementation of Adequate Trending for Condition Adverse to Quality

This item involved two examples related to CAQ trending identified during NRC IR 90-19. The first example was that, as of April 1990, CAQ escalation trend data was no longer being included in the monthly trend analysis report required by QMI-816.3, Trend Analysis. The second example was that the trending of workplan revisions and CAQs identified on maintenance requests was ineffective in that the information being accumulated tended to be of little or limited value in identifying adverse trends.

Regarding the first example, the licensee stated that, as of April 1990, the monthly trend analysis reports were being prepared in accordance with revised requirements contained in a higher-tier procedure, QMP-116.3, Trend Analysis, which had deleted the requirement for CAQ escalation data to be included. Upon discovery that the lower-tier procedure had not been similarly revised, the licensee committed to review both documents and make revisions as necessary to bring the upper and lower tier procedures into agreement. The current procedures pertaining to CAQ trending are STD-3.8, Trend Analysis, Revision 1, QMI-816.3, Trend Analysis, Revision 5, and AI-1.105, Trending Analysis, Revision 0. The inspector reviewed the above procedures and determined that QMI-816.3 and AI-1.105 (lower tier) cumulatively reflect the requirements of STD-3.8 (upper tier). (Note: Site Standard Practice SSP-3.8 was developed and will supersede QMI-816.3 and AI-1.105.) The inspector also reviewed monthly trend reports for February, March, and April 1991, and SCAR/FIR timeliness reports for June 1991 and determined that meaningful information to make management aware of any emerging adverse trends was included. This example is considered closed.

During the original inspection in 1990, the inspector agreed with the licensee's assessment that trending workplan revisions provided little beneficial information. Therefore, in Revision 2 to AI-2.8.15, Corrective Action-WBN, workplan revisions were removed from the ACP List of Activities Requiring Trending. Trending of CAQs identified on maintenance requests was accomplished in accordance with SSP-6.4, Equipment History and Failure Trending. The licensee is revising this procedure to provide enhanced guidance for accomplishing the trending of maintenance requests.

As discussed above, the inspector reviewed the licensee's actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, example two of this item will remain open pending NRC review of the proposed revision to SSP-6.4.

m. (Open) CDR 390/85-38, 391/85-37, AMP PIDG Terminal Lugs

This 50.55(e) report involves the discovery that AMP PIDG terminal lugs had been used on solid conductor wire. Per general construction specification G-38, Installation, Modification and Maintenance of Insulated Cables Rated Up to 15,000 Volts and manufacturer's instructions, these type lugs were designed for use only on stranded conductor wiring. This inappropriate use was identified on Class 1E discrete electrical components (resistors, diodes, capacitors, etc.) in Foxboro control loops and test points and in TVA relay racks and local panels. The licensee determined the cause of this deficiency was the failure to incorporate the requirements of Spec. G-38 into site installation/inspection procedures.

To preclude future recurrence, the applicable requirements for terminating solid conductor wiring were incorporated into the site installation and inspection procedures in late 1985 which have since been superseded. These requirements were implemented in MAI-3.3, Cable Terminating and Splicing for Cables Rated Up to 15,000 Volts, Revision 1, dated October 17, 1991. To correct the originally identified deficiencies, ECNs 5879 (Unit 1) and 5880 (Unit 2) were issued. The field work for Unit 1 has been completed by workplan E-5879-1 and 39 maintenance requests listed on TVA memo T06860219950. The field work for Unit 2 is not yet complete, and this includes some Unit 2 installations required to support operation of Unit 1 (i.e., systems 30, 31, 32, 62, 65, 67, 70, 81, and 90).

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the Unit 2 work needed to support Unit 1.

n. (Open) CDR 390, 391/91-18, Deficiency in RVHVS Piping Stress Analysis

This 50.55(e) report involved the discovery of a deficiency in the piping stress analysis for the RVHVS. The original analysis did not take into account the necessity for RVHVS to provide RCS letdown during events postulated to occur during Mode 1 operation, at which time the reactor would be at full operating temperature and pressure. This was caused by a failure to include the letdown mode operation in the design input documents. In addition, the primary mode of RVHVS operation (venting steam from the head) was not included as an operating mode in the stress analysis due to a lack of common understanding of the term "transient." Mechanical engineers understood the term to mean all non-steady state conditions, while

civil engineers use the term in two ways; the first was associated with rapid temperature fluctuations (for fatigue effects) and the second being associated with hydraulic transients (e.g., water hammer). As a result of this communication, the analysis was performed only to the mechanical interpretation of steady state conditions where no venting would occur.

The licensee performed a sample review of SIS, RCS, CS, and RHR system functions and determined that the only other instance where a similar condition could occur was in the pressurizer relief valve line. The analysis for this line was reviewed and found to have been performed properly. To preclude future recurrences of a similar nature the engineering manager issued a memorandum (RIMS B26910729029) stressing the importance of maintaining current information and data in design input documents. In addition, Design Standard DS-M5.1.1, Operational Modes Analysis for Piping Systems, Revision 1, has been issued to clarify the term "transient," and System Description N3-68-4001, Reactor Coolant System, was revised via DCNS-16826-A to incorporate the use of RVHVS as an RCS letdown path. To correct the original identified deficiency the licensee has committed to revise the RCS operating modes calculations, re-perform the piping stress analysis and redesign/modify the piping and/or supports as necessary.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the above referenced calculations, analysis and/or rework.

o. (Open) CDR 390/82-80, Shielded Power Cable Bend Radius Deficiency

This 50.55(e) report involved deficiencies pertaining to the installation of Class 1E cables. These deficiencies included violations of minimum cable bend radius criteria and the failure to properly define sidewall bearing pressure requirements. This item was originally identified to NRC in July 1982 and closed by NRC in IR 390/83-37, 391/83-26 in October 1983. However, due to subsequent employee concerns on these subjects, this item was reopened in August 1986.

Via letter dated June 29, 1990, (RIMS L44900629801), the licensee stated that this issue would be resolved under the CAP plan for cable issues. On April 25, 1991, the NRC issued a SER which approved the portions of the CAP plan pertaining to the licensee's approach to resolving the bend radius and sidewall bearing pressure issues. In addition, in order to prevent future similar deficiencies, detailed installation/inspection criteria were included within MAI-3.2, Cable Pulling for Insulated Cables Rated Up to 15,000 Volts, Revision 1, dated October 17, 1991, to cover these attributes:

The inspector reviewed the above actions and determined that corrective actions pertaining to recurrence controls were adequate for construction restart. However, this item will remain open pending final acceptance of activities required by the Cable Issues CAP.

p. (Open) CDR 390/90-03, Cable Proximity to Hot Pipes

This 50.55(e) report involved the discovery that WBN design criteria did not specify separation requirements for cables from thermally hot piping. This condition was discovered during a generic review of all TVA plants performed as a result of NRC Information Notice 86-49.

The licensee has initiated the following corrective actions to resolve this deficiency:

- Via letter dated July 31, 1990, (RIMS L44900731800), the licensee's proposed program, included within the cable issues CAP, was submitted for NRC review. Per SER dated April 25, 1991, the NRC staff accepted the licensee's proposed program.
- Separation criteria for piping 2 inches and larger in diameter, with temperatures of 250 °F or higher, were incorporated into General Construction Specification G-40, Installation, Modification and Maintenance of Electrical Conduit, Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems, Revision 11. Utilizing these criteria, a walkdown was performed in accordance with procedure WD-011, Walkdown of Hot Pipes and Components in Proximity to Electrical Raceways, Revision 1. The data compiled by this walkdown resulted in the issuance of DCN M-10422-A and DCN M-10815-A to resolve unacceptable interactions. To assure that future installations comply with the G-40 criteria, these criteria were incorporated into procedure MAI-3.1, Installation of Electrical Conduit Systems and Conduit Boxes, Revision 1.
- Calculation WBN-OSG4-138 was completed on October 18, 1991. This calculation provides the criteria for all piping less than 2 inches in diameter and for piping 2 inches and larger in diameter at temperatures below 250 °F. These criteria were then incorporated into Spec. G-40 by SRN-G-40-55 dated October 21, 1991. Additional field walkdowns and any resulting rework or reevaluations as a result of the issuance of these criteria have not been performed. MAI-3.1 is being revised to incorporate these criteria. This revision was anticipated to be issued in mid-November 1991.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for

construction restart. However, this item will remain open pending completion of actions encompassed within the Cable Issues CAP.

q. (Open) IFI 390/89-200-08, Lack of Protection for Installed Penetration Leads

This item involved damage to exposed electrical penetration leads discovered during an NRC team inspection conducted in November 1989. This damage was determined to have been caused by inadequate provisions to protect installed equipment from damage due to ongoing construction activities. A follow-up NRC inspection (IR 90-200) identified an additional concern in that the licensee had not incorporated the requirement for wet dielectric testing of repaired penetration leads into the repair procedures.

The licensee has subsequently instituted the following corrective actions:

- General Specification G-38, Installing Insulated Cable Rated Up to 15,000 Volts, was revised via SRNs 59 and 60 to incorporate requirements for the protection, inspection, and repair of penetration leads.
- Temporary walkways and/or temporary covers have been installed at or around electrical penetration assemblies to prevent additional damage due to future construction activities, per SR A-609568.
- Workplan WBP890302-1 was initiated to provide for the inspection and repair of currently damaged penetration leads. This work was not complete at the time of the construction stop work order. It should be noted that, due to the licensee's new work control program, this workplan will be superseded and the inspection and repair will be accomplished via a new workplan.
- MAI-3.2, Cable Pulling for Insulated Cables Rated Up to 15,000 Volts, Revision 1, and MAI-3.3, Cable Terminating and Splicing for Cables Rated Up to 15,000 Volts, Revision 1, have recently been issued. These procedures provide installation and inspection personnel the requirements for protecting, inspecting, and repairing penetration leads.
- Per additional information supplied by the manufacturer (CONAX), wet dielectric testing of repaired penetration leads is not required, provided Raychem WCSF-N material is used and installed in accordance with Raychem instructions. In addition, although wet dielectric testing is not required, the above referenced workplan, WBP890302-1, step A01 directs the responsible engineer to include testing instructions for all repaired leads after completion of the damage inspections and that prestart test engineering shall concur that all PMP requirements be deferred

until the scope of testing has been identified on a revision to the workplan.

The inspector performed a walkthrough of inboard and outboard penetration areas and determined that penetration leads were adequately protected from additional damage. The inspector also reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending the required inspections and repairs.

r. (Open) CDR 390, 391/91-19, Class 1E Teledyne Cable

This 50.55(e) report involved the discovery that Class 1E electrical cable purchased from Teledyne Thermatics did not comply with procurement requirements pertaining to material traceability and quality assurance records. This deficiency was discovered while the licensee was performing an audit at the manufacturer's facility.

To document this deficiency, PER WBPER910187 was issued. This PER was rolled over to SCAR WBSCA910247. A review of cable issue records revealed that two cables (O-3RM-90-116-a and O-3RM-90-130-A) from the deficient procurement were installed per workplan K-M08659A-01. All remaining cables have been placed on hold in the warehouse. The manufacturer has agreed to perform testing necessary to qualify the subject cable for Class 1E use. A subsequent audit of the manufacturer's facility determined that this deficiency appeared to be an isolated case. The second interim report to NRC (July 10, 1991) stated that it was anticipated that the above referenced testing would adequately resolve the deficiency and that a final report would be submitted to NRC by December 30, 1991.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending submittal of the licensee's final report and subsequent NRC review.

s. (Open) CDR 390, 391/89-08, Kapton Insulation Penetration Pigtail Damage

This 50.55(e) report involved the discovery of damaged Kapton insulation on the electrical penetration wiring (pigtail leads). The insulation damage was determined to have occurred either during Vimasco removal or during penetration installation. The cause of this deficiency was that engineering had not provided specific precautionary requirements and acceptance criteria for penetration pigtails.

The identified condition, proposed corrective action, and actions already taken to prevent recurrence are identical to those pertaining to IFI 390/89-200-08. Although actions taken relative to recurrence

controls are adequate for construction restart, this item will remain open.

t. (Closed) URI 390, 391/87-10-01, Design Control Of Modifications

This item involved the concern that the engineering procedures did not adequately require an evaluation to assure that field modifications to installed equipment would not invalidate the vendor's certificate of compliance. Subsequently, in NRC IR 87-17 it was reported that new engineering procedures were being written to adequately resolve the concern. Procedure WBEP-5.03, Design Change Notices, was issued on October 8, 1987, to require a documented review of all appropriate vendor documentation in addition to applicable codes, standards and licensing commitments when processing design changes. (The current revision of this procedure is 18.)

The inspector reviewed the above procedure and determined that it contained sufficient controls to assure that vendor documentation would not be invalidated by the site design change process. This item is closed.

u. (Open) CDR 390, 391/91-08, Deficiency In The Intake Pumping Station And Diesel Generator Building Environmental Control Systems

This 50.55(e) report involved deficiencies originally identified at SQN and subsequently determined to be applicable to WBN. These deficiencies were summarized as follows:

- (1) The electric space heaters and ventilation fans in the electrical and mechanical equipment rooms in the intake pumping station were classified as non-QA, non-seismic category I and class non-1E. Therefore, they could not be relied upon to maintain room temperatures between 65 and 108 degrees F. as described in the FSAR.
- (2) The HVAC equipment in the intake pumping station, including electric heaters and roof ventilators, was not qualified to seismic category 1(L) requirements. Therefore, during a seismic event, they could fall and damage Safety Related equipment beneath.
- (3) The electric heaters in the diesel generator building 480v board rooms were not safety related and could not be relied upon to maintain the minimum required room temperatures.

The licensee submitted their proposed corrective actions to NRC in Interim Report dated April 11, 1991. These actions include additional evaluations to determine the full extent of the identified condition, reviews of other plant areas to determine if similar deficiencies exist, development of recurrence controls once the full extent of condition and root cause has been determined and

determination and implementation of individual hardware modifications necessary to bring all identified deficiencies into compliance with FSAR requirements. The licensee has committed to provide a final report containing review/evaluation results and appropriate specific corrective actions.

The inspector reviewed the licensee's interim report and intended approach for resolving the identified deficiencies and determined that the currently proposed actions were appropriate and provide necessary corrective action and recurrence controls. This item will remain open pending submittal of the licensee's final report and completion of all resulting corrective actions.

- v. (Open) CDR 390/85-36, 391/85-35, Support Of Conductors Inside Vertical Conduit Runs
- (Open) CDR 390/89-02, 391/89-04, Support Of Class 1E Cables Installed In Long Vertical Cable Tray Runs.

These 50.55(e) reports involved a failure to adequately support Class 1E cables in vertical conduit runs and long vertical cable tray runs as required by the NEC Article 300-19 (1987). The licensee determined the causes of these deficiencies to be a failure to include vertical cable support criteria in Specification G-38, Installing Insulated Cables Rated Up To 15,000 Volts, for approximately four years after a revision to Electrical Design Guide DG-E13.1.1, Conduit-Cable Pull-Point Locations and Support Locations and a failure to follow the criteria after their inclusion into G-38.

The licensee's methodology and approach to resolution of these issues, along with any resulting hardware rework and/or modifications, will be accomplished in accordance with the Cable Issues CAP. The NRC staff has reviewed and accepted the licensee's methodology for resolution in a Safety Evaluation dated April 25, 1991. Field walkdowns, engineering evaluations and performance of field corrective actions are not complete. However, in order to assure that future installations do not result in similar deficiencies, the applicable criteria for supporting cables in vertical raceways has been included in Appendix B of MAI-3.2, Cable Pulling For Insulated Cables Rated Up To 15,000 Volts, Revision 1, dated October 17, 1991.

The inspector reviewed the above actions and determined that corrective actions relating to recurrence control were adequate for construction restart. However, these items will remain open pending completion of walkdowns, engineering evaluations and any resulting hardware rework and/or modifications.

- w. (Closed) CDR 390/91-12, (Open) CDR 391/91-12, Undersized Component Cooling System Instrumentation for RCP Thermal Barriers

This 50.55(e) report involved the discovery that certain pressure and flow instruments which monitor CCS supply to the RCP thermal barrier heat exchangers were not designed to accommodate pressures associated with a design basis heat exchanger tube rupture. The design pressure of CCS piping in most areas of the plant is 200 psig. However, the subject instruments were installed across a segment of CCS piping designed for a pressure of 2485 psig due to the postulated tube rupture. These instruments were procured with a specified maximum design pressure of 300 psig. It was not assured that, in the event of a tube rupture, the integrity of the RCS pressure boundary could be maintained. However, it should be noted that these instruments are functionally not safety related, and as such, are not required to operate during or after a design basis event; they must only retain pressure. The affected instruments are:

1, 2-PDT-70-94	1, 2-FT-70-95
1, 2-PDT-70-104	1, 2-FT-70-105
1, 2-PDT-70-117	1, 2-FT-70-115
1, 2-PDT-70-126	1, 2-FT-70-124

Actions taken to correct the identified deficiency were as follows:

- Based on verification obtained from the manufacturer, Foxboro, that FTs were rated for a design pressure of 3000 psig, it was determined that they can be used as installed. Foxboro's verification was documented via correspondence dated August 2, 1991, (RIMS B26910802751).
- One of the Unit 2 PDTs was subjected to pressure testing to determine if it could maintain a differential pressure of 2485 psig across its bellows. The successful results of this testing was documented in DCN S-16042-A, sheets 6 through 11 of 14 (RIMS B18910828339). Therefore, it was determined that the PDTs currently in Unit 1 can be used as installed.
- The licensee performed a review of other safety related fluid systems and determined that the identified deficiency was an isolated case. This review is documented in the extent of condition analysis of CAQR WBSA910170112.
- Recurrence controls are currently in place to assure that future design activities are not based on informal, undocumented interface communications. NEP-3.2, Design Input, NEP-5.1, Design Output, and NEP-5.2, Review, have implemented these controls.

The inspector reviewed the above actions and determined that the deficiency pertaining to Unit 1, including recurrence controls, has been adequately resolved, therefore, CDR 390/91-12 is closed. However, as corrective actions for Unit 2 are currently in an inactive status, CDR 391/91-12 will remain open, but the corrective

actions pertaining to recurrence control were adequate for construction restart.

- x. (Open) CDR 390, 391/87-01, Inadequate Support Shown On Typical Valve Support Drawings

This 50.55(e) report identified typical valve drawings 47A054-41 and -42 did not provide adequate support to maintain seismic qualification of the affected valves and piping. The licensee has determined this deficiency to be applicable only to solenoid-actuated valves attached to 3/8-inch heavy wall tubing used in radiation sampling lines (System 43), affecting approximately 125 valves (75 in Unit 1, 50 in Unit 2). The cause of this deficiency was a failure by design personnel to have the typical support design reviewed by component qualification personnel at the time of original design.

Actions taken to resolve this deficiency are as follows:

- Procedure CEB-DI-121.03, Seismic Design, Review, and Control contain the requirements for performing interface reviews. The licensee provided training rosters to show that design personnel were retrained in these requirements in August 1987.
- Engineering evaluations were being performed on the as-installed configurations of the affected valves and piping (in accordance with the HAAUP CAP). The results of these evaluations will determine the extent of any required hardware modifications necessary to maintain seismic qualification. These evaluations have not been completed.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the engineering evaluations and resultant hardware modifications.

- y. (Closed) URI 391/87-19-05, Non Safety Related Cable In Contact With Two Division Runs Of Safety Related Cable

This item involved a conduit containing cable 2PM6931 (non-Div.), a conduit with cable 2PM6929A (Div. A), and a conduit containing cable 2PM6930B (Div. B) in locations approximately four feet apart. The concern was that this condition was not addressed in either the FSAR or site procedures.

Information subsequently provided by the licensee revealed that cable 2PM6931 was a medium-level signal cable. Per FSAR section 8.3.1.4.3, energy produced by faults in this level of cable was considered insignificant and no challenge to the Class 1E cables. In addition, WBN Design Criteria WB-DC-30-4, Separation/Isolation, Revision 6, section 4.1.2.5, states: "There are no specific minimum separation

distances required between conduits carrying cables for non-Class 1E functions and conduits or cable trays carrying GSPS (Safety Related) cables."

The inspector reviewed the above information and determined that the originally identified condition was not in conflict with approved design criteria or licensing commitments. This item is closed.

z. (Open) CDR 390, 391/87-11, Failure To Coordinate Solenoid Valve Replacement Documents

This 50.55(e) report involved the improper installation of ASCO solenoid valves. In 1982, several of these valves were replaced (per ECN 3592) because they were not environmentally qualified. However, due to a failure to include civil and mechanical disciplines in the ECN review cycle, the operational and seismic adequacy of the replacement solenoid valves was questioned. Also, several of the replacement valves were not installed within 45 degrees of vertical as was required by vendor's instructions to assure proper operation.

Licensee's actions taken to resolve this deficiency were as follows:

- To preclude future recurrence, more clearly defined requirements for the performance of interdisciplinary reviews on design changes have been incorporated into site engineering procedures NEP-3.3, Internal Interface Control, NEP-6.1, Change Control, and WBEP-5.03, Design Change Notices.
- A walkdown was performed of the affected Unit 1 solenoid valves in accordance with procedure WP-17, Walkdown To Determine As-Installed Orientation Of Solenoid Valve Operators, Revision 1. The results of this walkdown revealed that 8 of the 27 Unit 1 valves were not installed in accordance with the vendor's requirements. DCNs P-04380 and P-04384 through P-04399 were issued to implement hardware modifications where required and to revise drawings to reflect the installed or modified configuration. These modifications have not been completed on either unit.
- An evaluation was performed in accordance with Calculation WCG-ACQ-0125, Seismic Evaluation Of Control Valves/Dampers Due To The Replacement Of Solenoid Valves. The results of the evaluation revealed that the seismic qualification of control valves and dampers associated with the replacement solenoid valves had not been compromised.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the above referenced hardware modifications.

aa. (Closed) URI 390/90-30-03, Backdating Workplan Data Sheets

This issue was discovered during NRC review of Workplan K-MO-8413-A-1. The actual pull length data for cable 1-4PL-31-4020-A was obtained and entered on the Cable Termination Sheet on December 10, 1990. However, the craft foreman backdated his signature to November 30, 1990.

In order to provide guidance for documenting late entries to QA records, IC 91-208 to AI-4.1, Processing and Storing Records, Revision 20, states that when such situations arise both the performed date and the signature date are to be shown with a "L.E." placed next to the signature date to signify a late entry. Subsequently, AI-4.1 has been superseded by SSP-2.9, Revision 0, Records Management and retains the same "L.E." guidance. Using this guidance, the Cable Termination Sheet was corrected on November 1, 1991, to show that the performed date was December 10, 1990, with a signature date showing "11-1-91 L.E."

The inspector reviewed the above actions and determined that the identified condition was corrected and recurrence controls are presently in place. This item is closed.

bb. (Open) URI 390/87-10-02, Use Of Stick-On Electrical Wiring Fasteners

This item involved the discovery that some ABCSMs, which secure wiring to the inside of panels, were found to be detached. The concern is that due to a failure of the adhesive, these mounts may be unable to support the cable during a seismic event.

To resolve this concern the licensee has taken the following actions:

- An evaluation was performed (Calc: WBPEVAR8904019) which concluded that prior use of ABCSMs was primarily for cosmetic purposes and their failure would have no impact on the seismic analysis of the panels. However, the above evaluation recognized that ABCSMs may be used in the future for purposes other than cosmetic (i.e., Class 1E wiring/cable separation) and to avoid any additional problems, they should be mechanically fastened to the panel body in the future.
- DCN F-09787-A was issued to provide methods for securely attaching ABCSMs to panel bodies. These requirements were also incorporated into Specification G-38, Installation, Modification And Maintenance Of Insulated Cables Rated Up To 15,000 Volts, in section 3.4.1.9 and into Drawing SD-E15.3.2, Switchboard Panel Wiring Methods, Revision 5.
- Field work associated with DCNs P-05479-A and F-09787-A to establish electrical separation for Class 1E wiring in accordance with the above requirements has not been completed.

The inspector reviewed the above actions and determined that actions relative to recurrence control were adequate for construction restart. However, this item will remain open pending completion of the field work associated with the above listed DCNs.

- cc. (Open) VIO 391/87-19-03, Failure To Perform Welding In Accordance With ASME Code Section IX

This Unit 2 violation contained two examples of failure to perform welding in accordance with ASME Section IX. The first example involved substitution of filler metal in weld process specification 1.M.1.2 and was identical to Unit 1 VIO 390/87-19-01 in content and corrective actions required. As previously reported in NRC IR 390, 391/89-04, section 4.1.g, all technical and programmatic aspects of the issue were resolved and the violation was closed. Therefore, example 1 of this violation is also considered closed. The second example involved the rewelding of a broken locking chain to the control housing of valve 2-03B-SB-ISV-869 without an approved welding procedure for the material welded.

Licensee actions taken to resolve example 2 were as follows:

- The Welding Engineering Unit conducted an investigation to determine the extent of condition. Since the weld in question was not to a pressure retaining part, the work was performed to non-ASME workplan NA003KZ. Therefore, a sample of 55 additional non-ASME workplans were reviewed and no similar instances of welding without an approved procedure were identified. In addition, a review was performed of all available workplans generated by the engineer responsible for workplan NA003KZ and no additional deficiencies were identified. Therefore, this workplan deficiency was determined to be an isolated case.
- The above workplan encompassed a total of six additional valves whose chains had been repair welded. CAQ WBN 871103PER was issued to track the corrective actions for all seven valves.

The inspector reviewed the above actions and determined that actions relative to recurrence controls for example 2 were adequate for construction restart. However, this example will remain open pending the closure of CAQ WBN 871103PER.

- dd. (Open) CDR 390, 391/86-59, Qualification Of ASCO Solenoid Valve Conduit Connector Configuration

This 50.55(e) report involved the discovery that some conduit connections to field-mounted electrical devices may have caused the seismic qualification of the device to be in question. As an example, ASCO solenoid valves were provided with pigtail wires that require termination or splicing to field cables. This required a conduit body (condulet) to be attached to the equipment housing to

accommodate the termination or splice. This weighted conduit resulted in a change in the center of gravity of the device and adversely impacted its seismic qualification. The cause of this deficiency was determined to be a failure to consider the seismic aspects of adding conduit hardware to field-mounted devices. Consequently, field installed configurations were neither controlled nor documented.

To address this deficiency the licensee has taken the following actions:

- Engineering established guidelines and design limits for acceptable configurations for use with the affected types of devices. These guidelines were in QIR CEB-87-086, Conduit Installation To Instruments, dated April 23, 1987, and QIR CEB-86-046, Electrical I&C Devices, Attachment Of Conduit/Condulet, dated November 3, 1986. Using these guidelines, design output has been provided via DCNs P-01094-B and C-03645-A. Reinspection of previously completed installations and implementation of resulting rework has not been completed.
- To preclude recurrence, enhanced requirements for performing interdisciplinary engineering reviews were included in NEP 5.2, Review, Revision 0, dated July 1, 1986. These requirements are contained in procedure EAI-3.05, Design Change Notices, Revision 0, dated September 23, 1991.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the above referenced reinspections and any resulting rework.

- ee. (Open) CDR 390/86-54, 391/86-52, Deficiencies With HVAC Duct Seismic Design Criteria

This 50.55(e) report involved the discovery that the seismic qualification of HVAC duct systems was in question due to inadequate design criteria. The theoretical frequencies determined by the design criteria equations were inconsistent with test results obtained subsequent to the criteria's issuance. Some ducts have free-end overhangs past the last support in a run which is outside the scope of the criteria's design assumptions.

To address this deficiency the licensee has taken the following actions:

- Design criteria WB-DC-40-31.8, Seismically Qualifying Round And Rectangular Duct, Revision 5, was issued on December 10, 1986, to incorporate revised criteria for the deficiencies originally

identified. The licensee has provided training records to document that engineering personnel have been trained in the revised criteria. Subsequently, Revision 7 has been issued to provide additional criteria to resolve issues from the HVAC CAP.

- Evaluations are being performed on installed duct systems to determine the extent of any hardware modifications necessary to bring them into compliance with the current criteria. The licensee has indicated that the evaluation effort is approximately 60 percent complete and that the remaining evaluation effort and any resulting hardware modifications are being tracked to completion through the HVAC CAP.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence control were adequate for construction restart. However, this item will remain open pending completion of activities associated with the HVAC CAP.

ff. (Open) CDR 390/86-22, Incorrect Use Of Typical Supports On Instrument Sense Lines

This 50.55(e) report identified typical supports were utilized to provide axial restraint for more instrument sensing lines than allowed by approved drawings. These typical supports were shown on drawings 47A051-35 and -35A. The cause of this deficiency was determined to be a misinterpretation of the drawing requirements. Table 1 of drawing 47A051-35 states that up to eight 1/2-inch pipes can be supported by a single typical support. However, note 2 on drawing 47A051-35A states that the support can only provide axial restraint for two 1/2-inch pipes or four 1/2-inch tubes. Apparently, note 2 was not applied to table 1 during installation/inspection of these supports.

To resolve this deficiency the licensee has taken the following actions:

- Per CAQR WBP900115SCA, all type 47A051-35 typical supports are being reinspected to identify the total population of discrepant installations which will then either be reworked or accepted as-is by engineering on a case-by-case basis. Currently, this effort was reported to be approximately 26 percent complete with reinspections performed on 342 supports, 25 of which were found to deviate from the requirements of note 2. As a result, DCNs F-07330-A through F-07343-A, F-07447-A, F-07448-A, F-08027-A through F-08034-A, and F-08540-A have been issued to document the as-installed conditions.
- In order to provide recurrence controls, procedure MAI-4.2A, Piping/Tubing Supports, contains more clearly defined installation and inspection guidance than that provided in previous procedures.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, this item will remain open pending completion of the above referenced reinspection/rework effort.

- gg. (Closed) IFI 50-390/89-200-11, QC Records Inadequate for Inspecting Wiring in Control Room Panels

This item involved QC verification of work packages associated with CRDR modifications. The item was listed both as an open item and an example of VIO 50-390/89-200-40 (example 3). NRC IR 50-390/90-200 documented a follow-up inspection and the item remained open pending QA review of completed CRDR work plans, human factors walkdowns, PMT on the devices in question, and completion of documentation demonstrating required inspection activities were complete. Quality control procedure QMI-8.10-3, Quality Control Inspection Reports, was reviewed during the follow-up inspection and the inspection team found the procedure to be adequate.

The inspector reviewed the deficiency, inspection reports, TVA responses and determined that corrective actions relative to recurrence controls were adequate for construction restart. The inspector also determined that both an open item and violation were open tracking the item. Therefore, open item 50-390/89-200-11 will be administratively closed and remaining action will be tracked by VIO 50-390/89-200-40, (violation A), Criterion X - Inadequate Inspection Activities.

- hh. (Open) IFI 50-390/89-200-28, Bolts For Connections Not Meeting AISC Requirements For Torque

This item involved inspection of platforms and connections in four areas of the reactor, auxiliary and control buildings to determine the adequacy of structural steel construction. The inspection team performed torque tests on a selection of 5/8, 3/4, and 7/8 inch A325 high strength bolts to determine whether they were installed in accordance with the AISC requirements. The inspection results revealed several deficiencies in torquing. NRC IR 50-390/90-200 documented a follow-up inspection on the issue. TVA issued two CAQRs to address the deficiencies. CAQR WBP890559 addressed bolts that were tightened "snug tight" and indicated that the root cause was misinterpretation of the term "snug tight". Corrective action included revising affected procedures to better define tightening nuts by the "turn-of-nut" method. Corrective action also included correcting the identified deficiencies and similar deficiencies in all areas of the plant. CAQR WBP890579 addressed bolting that had been installed with a calibrated wrench but did not meet AISC requirements.

TVA issued site instruction WBN-CPI-8.1.8-C-501A, Revision 2, as corrective action for CAQR WBP890559 which was rolled into Problem

Evaluation Report WBP890559PER. The instruction revision incorporated changes made to General Construction Specification G-53. Since that time, the site instruction was superseded by MAI-5.2, Bolting for Structural Connections. The MAI provided definitive guidance for tightening bolts by the "turn-of-nut" method. For bolting where a calibrated wrench was used, TVA conducted a drawing search and established calculation WCG-1-620, Verification of Structural Connections Installed by Calibrated Wrench, Revision 0, to demonstrate that the high strength bolts installed by this method could satisfactorily perform the design function in their currently installed condition.

The inspector reviewed the above actions, revised procedures and documentation and determined that corrective actions relative to recurrence controls were adequate for construction restart. The issue will remain open pending completion of all corrective action and CAQR closure.

ii. (Open) VIO 50-390/89-200-40, Criterion X - Inadequate Inspection Activities

This violation involved the following three examples:

- (1) Quality control inspectors at the Watts Bar plant did not verify the ratings and post installation attributes of installed devices (hand switches, indicating meters, and recorders) in the control room. The lack of QC inspector verifications was apparently a result of construction engineers eliminating inspection steps from workplans without the concurrence of the Quality Assurance Department.
- (2) QC records for control board wiring referenced TVA drawing 45W1640, Revision 3, which referenced Westinghouse specification 963267 that was not a controlled specification. Both documents were required to complete the installation. The Westinghouse specification was not within the licensee's program for controlled documents.
- (3) The work package data sheets used to document QC inspections in the control room were inadequate. Data Sheet 1 was used to document inspections of fabrication and installation of wire bundles, terminations of two separate wire ends and installation of jumper wires. The inappropriate multiple uses such as the addition of confusing footnotes and annotations resulted in the inability to determine what previous activities had been performed and inspected.

The licensee's initial response to the violation dated April 27, 1990, denied violation examples 1 and 3 and reported progress on example 2 in that the specification had been referenced in error and that the responsible individual was counseled. It was further

reported that additional training would be conducted for all engineering and QC personnel and that the generic issue would be resolved through the CAQR process.

NRC, in a letter dated June 13, 1990, acknowledged the response to the violation but did not accept the denials for examples 1 and 3. The letter acknowledged that changes instituted would resolve the issue.

NRC IR 50-390/90-200 documented follow-up inspection on the three examples as follows:

Example 1 of the violation was also identified as Open Item 50-390/89-200-10, QC Verification of the Ratings and Post Installation Attributes of Devices Not Performed. The follow-up inspection indicated that the QA program required the site QC organization to perform work control inspection of the critical and necessary attributes associated with the installation or modification of vendor supplied equipment. QA personnel determined that because the function of a hand switch was independent of the resistor rating, an inspection was not required at the time the hand switch was installed. Functional testing would be done as a part of PMT which would verify switch operation. The follow-up inspection team concluded that TVA had adequately resolved the issue by committing to track PMT to closure.

Example 2 of the violation was also identified as Open Item 50-390/89-200-12, QC Records Found to Reference Uncontrolled Documents. TVA initiated CAQR WBN090175 to document and resolve the issue. TVA found that the reference document had correct information so the issue did not present a technical concern. A training program was implemented for engineering and QC personnel on the use of controlled design documents for installations and inspection activities. The NRC follow-up inspection team concluded that the issue was adequately resolved the issue.

Example 3 of the violation was also identified as Open Item 50-390/89-200-11, QC Records Inadequate for Inspecting Wiring in Control Room Panels which is discussed and administratively closed in this inspection report. Programmatic controls to prevent recurrence were inspected and found adequate in NRC IR 50-390/90-200. The remaining action consisted of reviews, post modification testing, and documentation of the CRDR work packages in question. The violation example was left open pending completion of all action.

The inspector reviewed the above actions and documentation for action completed to date and determined that recurrence controls were

adequate for construction restart. The violation, however, will remain open pending completion of the remaining activities.

jj. (Open) Bulletin 50-390, 391/79-BU-02, Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts

This bulletin involved the failure of safety-related piping supports due to deficient anchor bolt installations. The bulletin addressed specifically those pipe support base plates that use concrete expansion anchor bolts in Seismic Category I systems as defined by Regulatory Guide 1.29, Seismic Design Classification, Revision 1, or as defined in applicable FSARs.

The licensee's formal response to the bulletin, Watts Bar Nuclear Plant (WBN) - Units 1 and 2 - Supplement to TVA Civil Engineering Branch (CEB) Report Number 84-08 - NRC OIE Bulletin 79-02 - Pipe Support BasePlate Designs Using Concrete Expansion Anchor - Final Report - Revision 2, was submitted on December 10, 1984. The response was accepted on the condition that 100 percent of the pipe support calculations be reviewed for compliance with the factor of safety requirements of the Bulletin and that all non-retrievable pipe support calculations be regenerated. Response to NRC requests for additional information concerning baseplate flexibility was submitted in August 1985 and updated in January 1991 due to changes in design methods made after the August 1985 submittal.

The WBN HAAUP analysis was initiated in 1989 and covers both large and small bore piping. TVA reported the large bore program complete and that it met bulletin requirements. For the small bore program, TVA reported revisions of load ratings of small bore typical pipe supports complete with expansion anchorage designs for being performed in accordance with the bulletin requirements. The evaluation of individual small bore pipe support variances and of engineered supports was planned to be complete by March 1992.

The program status and additional information on design methods was submitted to the NRC (NRR) by TVA on July 26, 1991. The submission received an initial review and a tentative agreement in principal on the TVA approach to baseplate flexibility but had not received formal approval or comment by NRR in a SER.

The inspector reviewed the above actions and documentation and discussed the bulletin response with regard to construction restart with staff at NRR. Although all required bulletin actions were not complete, corrective actions relative to recurrence controls were considered adequate for construction restart. The item will remain open pending completion of required actions.

kk. (Closed) CDR 50-391/81-39, Valve Modeling Error

The licensee reported on May 11, 1981, that the analytical model of ERCW valve 19 (valve drawing No. 20093) in piping problem N3-67-2A was incorrect. The model used did not represent the actual valve design because it did not include the valve center of gravity which could change the frequency of the piping system. The change in frequency could increase the present stress results and increase the valve acceleration. The valve regulated the flow to the shutdown board room air-conditioner condensers. Reanalyzing the piping problem with the correct valve modeling was in progress.

In a final report dated March 8, 1982, the licensee reported difficulty in determining the exact cause of the analysis error. The original analysis (9/76) contained an estimated valve weight and an assumed in-line center of gravity. The data was preliminary in nature and not based on a specific valve to be purchased for that location within the piping analysis (N3-67-2A). A specific valve drawing was issued for that location on November 20, 1979. The valve required a model change to accommodate a new center of gravity. However, later reanalysis of the piping analysis, Revision 4 and Revision 5, did not include the change. The licensee considered that error had resulted either from the valve drawing not being accessible to the analyst at the time of reanalysis or the drawing was assessable and the analyst failed to include the new data in the analytical model.

Corrective actions included: (1) upgrading the "Watts Bar Miscellaneous Valves Master Status Report, RPT009," and the "Instrument Valves Construction Status Report RPT010" to provide a cross reference listing between valve tag numbers, material mark numbers, contract numbers, and the manufacturer's drawing number; and (2) instructing the piping analysts to be thorough in collecting and reviewing the data needed to properly model the analysis problem. The reanalysis resulted in modifications required for approximately 20 supports.

In a revised final report dated March 11, 1982, the licensee reported that the two valve status reports RPT009 and RPT010 that had been reported complete were reported in error. The reports were in the process of being modified and were expected to be completed by April 30, 1982.

The same construction deficiency for Unit 1, CDR 50-390/81-40, was closed in NRC IR 50-390/83-35.

The original deficiency was identified and documented as NCRWBNCB8104. The deficiency was rolled over into the new corrective action program as SCAR NCRWBNCB8104SCA. The deficiency consisted of the specific problem with the valve analysis and the generic problem with retrieval of specific valve information. The generic problem is addressed in the closure of construction deficiency report CDR 50-390/81-25.

Performance of piping analysis work is currently controlled by engineering procedure WBEP-5.38, Analysis Procedure For Category I and I(L) Piping, Tab 11. The procedure required the piping analysts to use the current revisions of drawings when revising piping analysis. In addition, the SDITS discussed in WBEP-5.38 is used as an information source for each analysis problem. Piping analysts had been trained on use of the procedure.

The inspector reviewed the corrective action above and documented correction of the specific and generic problem. The inspector considered the corrective action adequate. CDR 50-391/81-39 is closed.

11. (Open) CDR 390/85-19, 391/85-18, Fire-Rated Penetration Assemblies Deficiencies

This 10 CFR 50.55(e) construction deficiency report involved several penetration assembly deficiencies associated with design drawings, penetrations, fire stops and fire doors. The deficient conditions were as follows:

- (1) Penetrations were breached without an adequate tie to the work requiring the breach.
- (2) Electrical penetrations and fire-stop assemblies were not sealed per TVA design drawings (45W833 series).

Subsequent investigation and walkdowns by the licensee identified the following additional deficiencies:

- (3) The thimble renewal sleeve through the reactor building shield wall was not provided with a fire-rated seal.
- (4) HVAC penetrations through the floor and ceiling of the entrance labyrinth of auxiliary building room 692.0-A31 were not protected by a three-hour fire-rated barrier.
- (5) Design drawings (47W240 series) did not reflect the latest compartmentalization information.
- (6) Doors A36 and A38 in the auxiliary building needed repairs to restore fire endurance ratings. Door W4 in the intake pumping station was not a fire-rated door as required.

The deficiencies were caused by a combination of drawing inconsistencies, deficient procedures and inadequate reviews.

A majority of the rework and modifications to correct specific hardware deficiencies had been completed with the exception of Unit 2 deficiencies covered by ECN 5762. Walkdowns and verification remaining under the various CAPs were not complete. Specific corrective action for hardware deficiencies will be addressed by verification of CAPs and Appendix R walkdowns required for licensing.

The following recurrence controls have been completed for the deficiencies listed above:

Item 1 - FPI-0100, Administrative Control, Revision 0, was implemented on October 14, 1991, to control fire protection administration at WBN during the construction phase. The new procedure includes controls for breaching of barriers during construction. The procedure considers that all passive fire barriers are inoperable during the construction period and that Fire Protection Impairment Permits would not be used for passive fire protection features such as fire doors (except CO₂/Halon, fire dampers, cable wrapping, and seals. Those barriers would be treated as system components and receive review to prove operability during system, component or area turnover to plant operations. The full impairment permit requirements would be imposed after turnover.

Item 2 - ECNs 5761 (Unit 1) and 5762 (Unit 2) were completed to revise fire protection compartmentalization, specify fire boundaries, revise penetration seals and fire stop details, and resolve walkdown deficiencies. The ECNs resulted in revision to the 45W833 and 47W240 series drawings.

Item 3 - This item was inspected and closed in NRC IR 50-390/90-22.

Item 4 - The physical work and workplan were inspected and documented in NRC IR 50-390/90-22. The report concluded this item was complete.

Item 5 - Discussed in item 2 above.

Item 6 - Designs drawings 46W454-6 and 46W454-13 for Doors A36 and A38 were revised to incorporate appropriate modifications that would restore the required fire endurance rating for the doors. Architectural drawing 46W454-1 was revised to identify Door W4 as an A-labeled fire door.

Provisions were made in EAI-3.05, Design Change Notices, Revision 0, issued on September 23, 1991, for review of plant changes that could have an impact on fire protection and referenced the use of EAI-7.02,

Modification Compliance Review - Fire Protection, Revision 0. EAI-7.02 provide for a detailed review of changes that could affect fire protection and Appendix R requirements.

The inspector reviewed the above actions and performed reviews of workplans, procedures and drawings and discussed the changes with fire protection engineers and licensing personnel. The inspector concluded that recurrence controls were adequate for construction restart. However, the item will remain open pending completion of the corrective actions.

- mm. (Open) CDR 390/85-35, Instrumentation Branch Lines That May Not Be Qualified

This deficiency involved the installation of some instrument branch lines in a configuration which was not seismically qualified. The portion of some instrument lines between the process root valve connection and its associated field-routed instrument line and/or flexible hose assembly had been installed with six inches to two feet more pipe than intended per the design drawings. The installations occurred as a result of NE's failure to provide the level of detail necessary on the design drawings for NC to interpret and implement the intended design.

To correct the deficiencies, the 47B001 series drawings were revised to provide detailed design requirements for typical configurations and directions for NC to submit variances to NE for approval. The drawings were revised under ECN 5858 which was completed and closed on November 8, 1985.

As a result of reevaluation, SCAR NCR6218SCA remained open to track completion of affected instrument lines and completion of the modification. The remaining corrective action, the SCAR, and CDR are within the scope of the Instrument Lines CAP. This condition for Unit 2 was being tracked under NCR6219SCA.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. The issue will remain open pending completion of the reevaluation and modification work.

- nn. (Open) CDR 50-390/85-51, 391/86-06, As-Constructed Drawing Deficiencies

The licensee reported that several as-constructed drawings for WBN did not correspond to the actual field-installed configuration. Specifically, drawings 47W600-80, Revision E, and drawing 47W672-172, Revision J, depicted a number of RCS transmitters that were mounted with 1/4-inch thick mounting brackets but 1/8-inch thick brackets were installed. The deficiency affected approximately 14

transmitters. The licensee reported that the brackets would be replaced under work plans 5320 and N6297-1.

The licensee later reported via CDR 50-390/86-07 and 391/86-06, dated January 13, 1986, additional construction deficiencies related to as-constructed drawings which involved a Unit 2 workplan and associated as-constructed boundaries. Two field change requests, which should have been only applicable to Unit 2, had changes identified in the FCRs which affected areas inside Unit 1 boundaries.

In a letter to NRC dated February 19, 1986, the licensee reported that the reportable CDRs and several other non-reportable drawing deficiencies prompted an examination of the as-constructed drawing program to determine if the deficiencies were indicative of a generic weakness in the program.

Extensive review of the drawing problems in 1985 and 1989 identified 73 deficiency documents associated with the Unit 1 drawing process. However, the licensee considered the program adequate but with weaknesses. The deficiencies were caused by lack of strict adherence to procedural requirements, lack of adequate controls to ensure drawings were changed to reflect modifications, and lack of attention to detail. The following corrective actions were implemented:

- (1) Establish a DBVP, to ensure continued maintenance of functional configuration at WBN.
- (2) Require the drawing program to be managed only by NE rather than by the dual engineering/construction approach.
- (3) Implement a single drawing system typically based on as-constructed or CCDs rather than having "as-constructed" and "as-designed" drawings.
- (4) Require all field work to be completed before drawings are updated.
- (5) Improve procedures including EAI-3.10, Drawing Categorization and Configuration Control Drawing Origination by DBVP, EAI 3.05, Design Change Notices, EAI 3.09, Incorporation of Change Documents into Drawings, and SSP-9.52, Initiating Design Change Notices.
- (6) Established a set of 1275 control room drawings which will receive additional walkdown and verification. The drawing set includes drawings needed for startup, operation and shutdown during normal and emergency conditions and to mitigate design base events.

The licensee additionally reported that, although not intended as drawing correction mechanisms, several CAPs in all disciplines would identify and correct problems encountered with drawings and that the

SSP would be an important element in the identification and resolution of drawing discrepancies. This was reviewed by the inspector which determined that corrective actions were adequate to provide recurrence controls for construction restart. However, this issue will remain open pending completion of the corrective actions.

- oo. (Closed) IFI 50-390/89-200-24, Undersized Vendor Welds on Tanks, Heat Exchangers, and Filters

This item involved undersized nozzle to shell welds on eight tanks, lack of adequate detail to inspect welds on two inverters and two supply fans, and undersized fillet welds on one damper. NRC IR 50-390/90-200 documented follow-up inspection activities on this item which indicated that the undersize welds would probably be acceptable by stress calculations which had not been completed. The inspection report indicated that a number of remedial actions such as increasing the number of audits, returning goods to vendors, and deleting suppliers from the approved list would be implemented. This item is Open Item 50-390/89-200-24 and example 1 of Violation 50-390/89-200-41, violation B. As a result, this open item is administratively closed and corrective action will be tracked under the violation.

- pp. (Closed) IFI 50-390/89-200-39, Inadequate Coordination of All On-Site Corrective Action Programs

The CAT determined that the licensee was not adequately integrating and coordinating various corrective action programs, special programs and related activities such that all required work activities and corrective actions would be accomplished in a timely manner. NRC documented in follow-up inspection IR 50-390/90-200 that the licensee had made progress and had recently improved scheduling, integrated activity schedules, and cross-referencing of work activities. The item was left open to evaluate the improvements.

The licensee had three major activity schedules - Level 1, Level 2, and Level 3. Level 1 addressed major activities by organization (modifications, engineering, etc.) with completion schedules for elements within the organization. The Level 2 schedule contained lower level activities which supported Level 1 activity completions and the Level 3 schedule tracked issues such as corrective action documents, DCNs, ECNs, regulatory issues, modifications, employee concerns, commitments, and other activities.

At the time of the CAT inspection (September 1989) the licensee had a Level 3 computerized scheduling system with predominant scheduling activities being construction workplans, plant maintenance requests and restart test activities supporting Unit 1 startup. A summary Level 2 schedule, known as the 120-day schedule, developed in March 1989 was based on fiscal year milestones which supported project completion and was maintained on a personal computer with no linkage

to the Level 3 schedule at that time. In August/September 1990, the Level 2 logic and schedules were developed for completion of each project and loaded into a mainframe data base similar to the Level 3 schedule. The project completion logic, Level 2 information, was tied to systems completion and restart logic, Level 3, information. In addition, completion logic was developed for issues such as TS, the FSAR, operating training, security implementation, emergency response implementation and others. In January 1991 a Level 1 summary schedule was implemented from the same data base.

In 1989/1990, engineering utilized the TEST System to schedule work at a lower level than the site Level 3 schedule but reported the system was not very successful. In 1990, the TEST information was updated and uploaded into the Level 3 schedule and then the TEST was abandoned. A new system, the modification status system was being implemented to track individual workplans and maintenance requests at a level below the Level 3 system.

In 1990, reviews to ensure all significant document closures were scheduled in the Level 3 schedule were initiated. The approach was to define the significant documents to be scheduled, such as ECNs, DCNs, calculations, studies, open items, procurement, procurement deliveries, workplans, MRs, restart testing, CAQRs, CATDs, and others. The Level 3 schedule was maintained in a separate database from the Level 1 and Level 2 schedules, but the schedules were cross-referenced. All activities on the Level 3 schedule were assigned a responsible owner. TVA reported other areas of improvement in scheduling and coordination which included:

- Development of an integrated plan and schedule for closure of the civil/seismic CAPs.
- Utilization of a SMPL to ensure that activities which affect restart systems are completed prior to declaring a system ready for restart testing.
- Preparation of project plans for directing, controlling and assuring proper completion of the projects. Project plans include a section on integration which is normally used to describe major interfaces with other projects.
- Use of daily meetings for integration and coordination which included the plant and construction, startup, and planners daily meetings. The Level 1, 2, and 3 schedules and the daily activity schedules were used as basis information for meetings.

The inspector reviewed the above actions, reviewed copies of the Level 1, Level 2, and Level 3 schedules, and determined that integration and coordination of all organizational elements, work activities, corrective action programs and item closures was complex. The basis for the original issue was the lack of linkage between various schedules and the lack of responsible owners for all

scheduled activities and issues rather than specific deficiencies. However, the inspector concluded that significant improvements were made in the scheduling and coordination function which should result in a better program. IFI 50-390/89-200-39, Inadequate Coordination of All On-Site Corrective Action Programs, is closed.

- qq. (Closed) CDR 50-391/81-25, Retrievable Valve Information Used in Piping Analysis

The licensee reported that manufacturer's valve drawings which include pertinent engineering data used in piping analysis and other design calculations could not be readily retrieved through document control as required by 10 CFR 50, Appendix B. Proper identification of valves should be maintained by part number, serial number or other appropriate means on the valve bodies and cross-referenced on all associated drawings and permanent records. This identification is used for the retrieval of records and is designed to prevent the use of incorrect parts and components in piping systems. The licensee was in the process of evaluating what action was required to develop a better documentation system. The deficiency was identified and documented as NCRWBNCEB8104 and had since been rolled over in the new corrective action program as SCAR NCRWBNCEB8104SCA.

The licensee reported that procedure WBEB-5.44, Master Valve Status Report, was issued to; (1) reflect the EMS data base as the computer system used to store and control the use of plant configuration information; (2) assign responsibility for valve information update and data input; and (3) provide direction for extracting valve reports from the EMS. The EMS referred to the QA qualified database which was being incorporated into the newer EQIS. Procedure WBEB-5.44 was scheduled to be superseded by EAI-8.18, Master Valve Status Report Quality Controlled List - Issue, Control, and Maintenance.

The corrective action for SCAR NCRWBNCEB8104SCA was verified and the SCAR was closed. The same construction deficiency for Unit 1, CRD 50-390/81-26, was closed in NRC IR 50-390/83-35.

The inspector reviewed applicable corrective action and procedures and concluded that licensee's action on this construction deficiency was adequate. CDR 50-391/81-25, Retrievable Information Used in Piping Analysis, is closed.

- rr. (Open) CDR 391/83-23, Spacing and Clearance of Sprinkler Heads in the HPFP System

The licensee reported deficiencies with the HPFP system that were not in strict compliance with the NPFA Standard 13. The deficiencies included:

- Sprinkler heads located less than six feet apart with no intervening structure or baffle.
- Sprinkler head spray patterns reduced by pipe hangers, HVAC ducting, conduit, cable trays, and pipe.
- Incomplete spray coverage.
- Sprinkler heads located beyond maximum allowable distance below ceiling with no heat collectors.
- Sprinkler heads damaged by construction activities.

The licensee determined that the deficiencies resulted from design and construction personnel not understanding the criteria for maintaining adequate spray patterns and sprinkler head placement. Sprinkler system deficiencies had been a generic problem at all the licensee's nuclear power plants.

The licensee conducted HPFP system walkdowns in May 1983 and implemented ECN 3867 to correct the identified deficiencies in Unit 1 and common areas. ECN 3867 also resulted in the issuance of drawing 47A491-1B which defined the acceptance criteria for sprinkler obstructions. Additional walkdowns were conducted in November 1983 because additional sprinkler obstructions were created by the installation of pipe and duct insulation, hangers, and missile barriers after the initial walkdowns. More than 25 FCRs were issued and completed to correct the additional deficiencies. Drawing 47A491-1B, which provided the obstruction criteria, was inadvertently cancelled so that for a period of time, no criteria was in effect. The criteria was reissued on June 27, 1991, by DCN S-16194A as drawing 47A491-1C. The drawing provided criteria for all new installations and modifications to existing installations. In addition, MAI-2.3, Commodity Clearance, Revision 1, provided general clearance instructions for pipe and other components which includes precautions on interference with sprinkler heads. The verification of the HPFP system sprinkler head locations, coverage and interference is within the scope of the Fire Protection CAP.

Construction deficiency report CDR 50-390/83-24 for Unit 1 was closed in NRC IR 50-390/84-23 after the initial May 1983 walkdowns and corrective actions were taken. The Unit 2 CDR was left open since Unit 2 action was not complete.

The inspector reviewed the above actions and determined that corrective action relative to recurrence controls were adequate for

construction restart. The Unit 2 CDR 50-391/83-23 will remain open pending completion of corrective action for Unit 2.

ss. (Open) CDR 390/85-31, 391/85-30, Incorrect Equipment Cable Terminations In Harsh Environments

Several Class 1E equipment cable terminations were identified that were not installed correctly. The affected cables were located in areas designated as having a harsh environment and were below the computed maximum flood level as shown on design drawings. The deficient terminations and splices were made up using 3M Scotch 70 and/or Scotch 33 electrical tape rather than Raychem and some had been terminated using unapproved end caps. The licensee determined that the deficiency resulted from the misinterpretation of TVA electrical standard drawings by construction personnel.

The corrective action to prevent recurrence included the following:

- Class 1E terminations and splices that were in harsh and mild environments at WBN Unit 1 were identified and documented in calculation WBPEVAR8904055. The calculation identified terminations and splices for equipment on the 10 CFR 50.49 Electrical Equipment list.
- The electrical standard drawings were revised to reference General Engineering Specification G-38 which specified the environment conditions and equipment categories that require the use of Raychem materials for termination and splicing.

The specific deficiencies were tracked as NCRWBN6224SCA for Unit 1 and NCRWBN6208SCA for Unit 2. Some Unit 1 work was completed. Both SCAs were open pending completion of required rework.

The inspector reviewed the above actions and determined that corrective actions to address recurrence control were adequate for construction restart. However, since the work has not been completed this construction deficiency will remain open pending completion and documentation of all required rework.

tt. (Open) CDR 390/85-50, 391/85-49, Inadequate Slope on Instrument Sensing Lines

The licensee reported that a number of instrument sensing lines were found which did not conform with the minimum slope requirements specified on drawing 47W600-0-4 general notes. The licensee considered that the condition was generic and resulted from nuclear design requirements and poor installation requirements and techniques.

To correct the deficiency, the following actions were implemented:

- Engineering Requirements Specification ER-WBN-EEB-001 was issued on June 11, 1987, to provide the necessary installation, inspection, and documentation requirements (including slope) for instrument lines. The specification was subsequently superseded on June 24, 1991, by Project Specification N3E-934 which provided instrument sensing line requirements.
- The 47W600 series drawings were revised by ECN 6772 to delete the general notes which had been incorporated into the new specification.
- The guidance for instrument sensing line installation was incorporated into MAI-4.4A, Instrument Line Installation. MAI-4.4A provides installation and inspection criteria for instrument sensing lines.
- Nuclear Engineering performed reviews of the site implementing procedures and provided concurrence signatures on procedure coversheets.
- Training for appropriate personnel was completed for the engineering, construction, plant modification, and quality assurance organizations on the revised implementing procedures. The current training programs for Modifications, Engineering, and Quality Assurance personnel include periodic training on procedures governing the instrument sensing lines.
- Several workplans covering the scope of the instrument sensing line subject and the slope deficiencies were issued to complete the reinspection and rework required. A portion of those workplans have been completed.

During January 1991, NRC inspection 50-390/91-02 identified VIO 50-390/91-02-01 regarding two instrument lines with inadequate slope after rework. The lines were determined to have been damaged after installation and final QC inspection. Corrective actions to resolve this deficiency were addressed in the response to violation dated May 13, 1991. The violation was considered a separate construction restart issue and will be addressed separately.

The inspector reviewed the above corrective actions and procedures governing instrument sensing line installation and inspection. The inspector also reviewed training modules used to perform training and records of completed training for modifications, quality assurance, and engineering personnel. The procedures and training appeared to contain adequate guidance for installation and inspection of instrument sensing line. The remaining work to be completed and specifically instrument line slope is within the scope of the instrument Lines CAP. The inspector considered that recurrence controls were adequate for construction restart. The issue will

remain open pending completion of reevaluation and modifications to instrument sensing lines.

- uu. (Open) CDR 50-390/85-54, 391/85-51, Improper Use of Cables Inside Containment

This deficiency involved the acceptability of silicone-rubber-insulated power cable and control cable provided by Anaconda-Continental Wire and Cable Corporation and designated for use in 1E circuits inside containment. TVA reported that the cable was purchased through contracts 74C7-85112 and 75C7-85861 and was acceptable to the requirement in effect at that time. However, with the advent of more definite testing procedures, questions were raised concerning the cables' ability to withstand the levels of radiation which could be present inside containment during a LOCA. NCR EEB 79-6 was issued to resolve the issue and subsequent measures were taken at the site to restrict the use of this cable by retagging the affected cable spools as Class II rather than Class I.

Subsequent to retagging of cable reels, 32 reels were found in a staging area, 2 reels were not tagged, and 12 reels were still tagged as Class I. NCR 6302 was written to document the deficiency and two additional NCRs, 2177R and 2361R, were written to document actual improper use of that type of cable in plant.

Corrective actions involved identification of any cables that required replacement and establishing methods and procedures to prevent recurrence of similar deficiencies.

A summary of the licensee's corrective action included the following:

- Wyle Laboratories completed testing for Sequoyah and Watts Bar cables used inside containment. Wyle Test Report 17733-1 documented the testing. The original testing was done for Sequoyah and later applied to Watts Bar due to similarity of adverse conditions in both containments during accidents.
- The NCR and SCR identified 11 cables supplied under the two contracts which had been pulled for 1E applications. SCAR SCRWB6302SSCA was still open tracking corrective action which included the replacement of the 11 cables.
- Calculation WBPE VAR8604005, completed in the 1985-1986 time frame, identified cables requiring qualification under 10 CFR 50.49. The calculation was later superseded when EQ binders were developed and issued on September 30, 1986.
- EQP identified 22 cables supplied under 6 contracts whose environmental qualification would be questionable without further testing. Those 22 cables included several of the cables previously identified by NCR6302. ECN 6625 was issued to

replace the 22 cables. Subsequent to the ECN, three DCNs were issued which superseded the ECN. The DCNs were issued to replace cables due to cable damage considerations and included cables identified in the ECN.

- EAI-3.15, Cable and Conduit Record Development and Issue Procedure, Revision 2, prohibits the use of silicone-rubber-insulated cables in Class 1E applications without engineering approval. The procedure requires that cable information sheets be generated for each cable. The cable information sheet would include cable specifications including contract number. Design Criteria WB-DC-30-5, Power, Control, and Signal Cables For Use In Category I Structures, Revision 4, stipulates that silicone-rubber-insulated cable shall only be used in non-safety-related circuits.
- MAI-3.2, Cable Pulling for Insulated Cables Rated Up To 15,000 Volts, Revision 1, requires QC inspection for all Class 1E and 10 CFR 50.49 cable pulls. MAI-3.3, Cable Terminating and Splicing For Cables Rated Up To 15,000 Volts, Revision 1, requires cable pulling information be recorded on an attachment and transmitted to NE for review.
- EAI-7.05, Watts Bar 10 CFR 50.49 Program Requirements For Environmental Qualification of Electrical Equipment, Revision 0, controls the maintenance of the EQ binders and 10 CFR 50.49 list. The procedures provide for the use of EQ Change Supplements to document the qualification installed or modified after construction restart.

The inspector reviewed the above actions and documentation and determined that corrective actions relative to recurrence controls were adequate for construction. Since all hardware corrective action was not complete, the construction deficiency reports for Units 1 and 2 will remain open.

- vv. (Open) VIO 50-390, 391/91-02-01, Instrument Lines Slope and Unistrut Clamp Installation Do Not Meet Drawing and Procedure Requirements

This violation involved the failure of two reworked instrument sensing lines to meet minimum slope requirements and a Unistrut clamp which was misaligned with the Unistrut channel. One emergency gas treatment and one emergency raw water cooling instrument line did not have required slopes of 1/4 to 1/2-inch slope per foot as required by drawings 47W600-1837-1 and 47W600-985-2 and a Unistrut clamp was not properly installed as required by CEP-8.1.8-C-501A.

The licensee's assessment of the slope deficiencies, while not conclusive, indicated that construction activities in area of the sensing line could have bent the lines after installation and QC acceptance. For the misaligned Unistrut clamp, the licensee

determined that the installers and QC did not follow the installation process instruction probably due to inattention to detail and further inspections identified other cases of misaligned Unistrut clamps and slope deficiencies.

The following corrective actions in response to the deficiencies and violation were initiated by the licensee:

- Engineering specification N3E-934, Instrument and Instrument Line Installation and Inspection, was revised to allow minor configuration changes that could occur after initial installation and inspection. The change allowed that although a minimum installation slope of 1/4-inch per foot was required, post installation inspections would be adequate as long a minimum of 1/8-inch per foot was maintained and slope reversals were not encountered.
- Management issued an information notice to site employees regarding configuration maintenance and prevention of damage.
- Requirements were added to site instruction, Construction Project Rules and Regulations, for each employee to acknowledge by signature the requirements for maintaining equipment configuration and preventing damage and a statement regarding disciplinary action associated with the requirements was added. The Construction Project Rules and Regulations were reissued as a part of the GET program.
- Training was provided to modification personnel, mandatory instructions were added to workplans to protect adjacent equipment, equipment protection requirements were added to pre-job briefings and documentation of supervisor compliance with equipment protection was added to the workplan completion process.
- Training was provided to quality control inspectors on process instruction requirements for proper Unistrut spring nut engagement.

The reinspection and evaluation of slope for instrument sensing lines which had been installed and accepted as part of the Instrument Lines CAP was not complete at the time construction was stopped. Planned action to identify instrument lines that were particularly prone to damage and design changes to protect those lines was also not complete.

The inspector reviewed the above actions, procedures, and documentation with regard to adequacy of recurrence control for new hardware installations or modifications and determined them adequate for construction restart. The violation, however, will remain open pending completion and NRC review of the corrective actions.

ww. (Open) VIO 50-390/89-200-41, Criterion VII - Inadequate Inspection Procurement Activities

This violation involved the following four examples:

- (1) Undersized nozzle-to-shell welds on tanks, heat exchangers, and filters.
- (2) Varying fastening arrangements existed on fan-damper assemblies for the emergency diesel generator room exhausts and the fan-damper assemblies had not been seismically qualified as an assembly, as required.
- (3) Heat-shrinkable tubing did not meet vendor requirements for overlap on electrical penetration leads. The vendor required a two-inch overlap and the heat-shrinkable tubing on all leads for electrical containment penetration 27 for Train A control power had overlaps of less than two inches, with several instances of 1/4- to 1/2-inch overlap.
- (4) Wiring with bend radius deficiencies in the diesel generator 6.9 kV control board DG-1A-A, motor control centers 1MCC-214-A1-A and 1MCC-214-B1-B, and hydrogen monitor 1-H2AN-43-200. In addition, the hydrogen monitor also contained 30 terminations which did not meet electrical specification G-38 requirements in that the wire protruded through the lug more than 1/16-inch and all strands of the wire were not terminated on the terminal screw.

The licensee concluded that the four examples were a result of weaknesses in the vendor's QA programs as well as weaknesses in TVA's source surveillance and receipt inspection programs which failed to identify the items. However, the four examples were associated with equipment received before 1986 and that, as described in the TVA NPP, Volumes 1 and 4, a long-term effort in 1986 was begun to identify and correct QA-related problems. Significant changes included:

- Vendor audit and surveillance organizations were combined under one manager in QA.
- Integrated audits and surveillance planning based on trending data were incorporated.
- New contracts for QA equipment provide for access to vendor facilities to perform surveillance in addition to the right of access to perform audits.
- Improved surveillance plans were implemented to provide more specific requirements for reviewing vendor activities.

- QC receipt inspection procedures now provide checklists to ensure that material is received in accordance with contract requirements.
- QC receipt inspection facilities and personnel qualification/training requirement have been upgraded.

The licensee committed to evaluate and correct the specific deficiencies associated with the violation and address the generic concerns through the CAP. This included corrective action for the undersized vendor welds.

A CAT inspection was performed and documented in IR 50-390/90-200, with the following results:

Example 1 of the violation was also identified in the report as Open Item 50-390/89-200-24, Undersized Vendor Welds on Tanks, Heat Exchangers, and Filters. The follow-up inspection indicated that the undersize welds would probably be acceptable by stress calculations which were not completed. The inspection report indicated that a number of remedial actions had been implemented such as increasing the number of audits, returning goods to vendors, and deleting the involved suppliers from the approved list. The proposed corrective actions were determined acceptable.

Example 2 - CAQR WBP890511, upgraded to PER WBP890511PER, was generated to track corrective action and resolution of the issue. An evaluation and calculation, WCG-ACG-332, was completed which indicated that seismic qualification would be adequate after modifications identified in DCN M-13961-A were completed. To provide recurrence controls, procedure WBEB-6.01, Procurement, was revised to require the vendor to provide an outline assembly drawing of the supplied equipment showing the locations of all attachments supplied with the assembly, even if the attachment were supplied by a third party. Hardware modifications to correct the deficiency had not been started.

Example 3 of the violation identified Open Item 50-390/89-200-7, Inadequate Raychem Splices on Penetration Leads. The licensee generated CAQR WBP 890567 to track this issue and committed to replace the subject Raychem tubing on all Conax electrical penetrations associated with safety-related circuits.

Example 4 of the violation identified the following Open Items in NRC IR 50-390/89-200:

- 50-390/89-200-13, Damage to Transformers and Excessive Bending of Vendor Cables in Diesel Generator Control Boards.

This issue was reinspected and closed in report 50-390/90-200.

- 50-390/89-200-14, Vendor Wiring Deficiencies in LOCA Hydrogen Monitors.

This issue was addressed and closed in report 50-390/90-200.

- 50-390/89-200-15, Vendor Wiring Deficiencies in Motor Control Centers.

This issue was addressed and closed in report 50-390/90-200.

The inspector reviewed the corrective actions and associated documentation and determined that the recurrence controls were adequate for construction restart. The violation will remain open pending completion of all corrective action.

- xx. (Open) CDR 390/85-53, 391/85-50, Incorrect Cable Terminations for Class 1E Applications in Harsh Environments

This item identified the use of electrical cable splicing methods and materials that were not qualified for Class 1E applications in harsh environments. The licensee determined that the cause of the deficiency was that General Construction Specification G-38, Installation, Modification, and Maintenance of Insulated Cables Rated Up to 15,000 Volts, did not specifically require nor clearly state that only qualified materials could be used for Class 1E applications in harsh environments.

The licensee has revised the G-38 specification and the implementing procedure, MAI-3.3, Cable Terminating and Splicing for Cables Rated Up To 15,000 Volts, Revision 0, to clearly define the requirements for use of qualified termination and splicing materials for Class 1E applications to correct this deficiency. The licensee has developed a list of Class 1E cable splices in harsh and mild environments. Harsh environment splices will be replaced and mild environment splices will be reworked where environmental conditions exceed the parameters of the splicing materials used.

The inspector reviewed the above actions and determined that recurrence controls were complete and adequate for construction restart. However, the remaining actions of reworking all unqualified Class 1E splices and terminations to resolve the construction deficiency have not been performed. Therefore, this item will remain open pending completion of the required rework.

- yy. (Open) CDR 390/85-43, 391/85-42, Questionable Compression Fittings on Instrumentation Tubing

This item involved the installation of compression fittings contrary to manufacturer's recommendations. Discrepancies included, e.g., tubing cuts not deburred, tubing not bottomed out inside the fittings, nuts not properly tightened, and ferrules either unidentified, missing, or reversed.

The licensee determined that the condition resulted from inadequate construction specifications, inadequate or non-existent site procedures, and inadequately trained construction craftsmen.

To determine the effect of improper installations, the licensee conducted a comprehensive test program of improperly assembled compression fittings and concluded that fittings previously subjected to a satisfactory hydrostatic test were acceptable for service. Fittings which were not subjected to pressure tests, but could see radioactive fluid service, and some instrument lines which may not have been hydrostatically tested were not acceptable for service.

To correct the deficiency, the licensee revised the construction specification G-29, Process Specification for Welding, Heat Treatment, Non-destructive Examination and Allied Field Fabrication Operations, Revision 1, and applicable drawings and field implementing procedures to incorporate manufacturer's requirements related to fitting installation. Craft personnel were trained to the new procedures and field inspection of lines not subject to pressure tests, but could see radioactive fluid service were performed.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, the remaining action of pressure testing the Unit 1 instrument lines designated as seismic category I or I(L) subject to testing to resolve the construction deficiency involve field work that cannot be performed until construction restart is authorized. Therefore, this item will remain open pending completion of the required work.

- zz. (Open) CDR 390/83-46, 391/83-45, Improper Routing of Radioactive and Nonradioactive System Instrument Lines

This deficiency report concerned the connection of non-radioactive system instrument vent and drain lines to the radioactive waste closed drain system. The condition presented the potential for radioactive material to enter non-radioactive systems when two or more normally-closed instrument drain or high-point vent valves were in the open position simultaneously during operation. This routing of all instruments on a panel to the closed drain system was typical.

The licensee disconnected all drain and vent lines not associated with a radiation hazard, including Systems 72 and 78, Containment Spray and Spent Fuel Pool Cooling, respectively to correct the deficient condition. Later, NRC inspectors identified Systems 72 and

78 as potentially contaminated. The licensee then attempted to re-connect System 72 and 78 vent and drain lines to the closed drain lines, but did so improperly.

The licensee has now revised applicable drawings and the project engineering specification to identify those systems that must have their high-point vent and drain lines connected to the closed drain system. A DCR 536 was issued to uniquely identify and tag each instrument valve in a safety-related system, and IMI-150, Essential Instrumentation Operability Verification, Revision 3, was issued to assure that pertinent valves are verified in their proper position prior to operation.

The inspector reviewed the above actions and determined that those relative to recurrence controls were adequate for construction restart. However, the remaining actions of field rework and valve tag installation to resolve construction deficiencies have not been completed. Therefore, this item will remain open pending completion of the required work.

- aaa. (Open) VIO 391/85-43-01, Failure to Provide Adequate Procedures and Failure to Follow Procedures for Housekeeping and Preventive Maintenance of Safety-Related Equipment, Components, and Systems (Unit 2 only)

This violation consisted of two parts, A and B. Part A identified an example of the Office of NUC PR failing to accomplish work activities in accordance with procedure. CCPs 2A-A and 2B-B were transferred to NUC PR from the OC, but were not entered into the NUC PR PMS for approximately two years. Preventive maintenance work items were due during the period, but not accomplished.

Part B identified several examples of the OC terminating or not performing PM inspections of Unit 2 SI pump motors and Unit 2 CCP reduction gear assemblies for periods of time up to two years after the inspections were due. Additionally, quality control procedures did not implement required inspections and controls in open safety-related electrical junction boxes to assure cleanliness and continuity of temporary power to safety-related equipment.

The license determined that Part A of the violation was not a failure to follow procedure, but a breakdown in the transfer process that was unique to the circumstances of the transfer (Note: portions of the pump were shipped to Sequoyah Nuclear Plant as repair parts). Part B of the violation was determined to be procedural inadequacies, oversight, and failure to properly specify transfer boundaries during a unique but isolated occurrence.

To correct Part A, the licensee prepared a discrepancy report to document and correct the deficiency. The component level PMs, including the gearboxes, have been prepared and implemented for the

CCPs. To correct Part B, the licensee has reviewed Unit 2 non-transferred safety-related motors to assure their inclusion in the PM program and re-instated the affected equipment to the program. Procedural inadequacies have been corrected by procedure revision.

The inspector reviewed the above actions and determined that corrective actions relative to recurrence controls were adequate for construction restart. However, some maintenance-oriented inspections and corrective actions remain for Unit 2 when work has been resumed. Therefore, this item will remain open.

bbb: (Open) CDR 50-390/86-27, 50-391/86-23, Flexible Conduit Not Installed to Compensate for Thermal and Seismic Movements

This report identified improper installation of Class 1E flexible conduit which involved displacement and length requirements that were not in accordance with the General Construction Specification G-40. Three categories of deficiencies were noted: flexible conduit to pipe mounted devices did not compensate for seismic and thermal movement, violation of minimum bend radius, and conduit to floor mounted equipment did not allow for lateral seismic movements.

The licensee determined the deficiencies resulted from NE's failure to provide adequate installation requirements in design output documents such as drawings and procedures. Additionally, NE did not identify those conduits subject to thermal and seismic movement.

To correct the deficient condition, the licensee revised the G-40 specification to clarify and define flexible conduit installation requirements for displacement, minimum length and bend radius, and provided inspection criteria. A new field procedure, MAI-3.1, Revision 0, Installation of Electrical Conduit Systems and Conduit Boxes, was issued that implements the G-40 specification with installation and inspection requirements.

The inspector reviewed the above actions and determined that the corrective actions relative to recurrence controls were adequate for construction restart. However, this item remains open pending completion of the remaining work.

ccc: (Open) CDR 50-390/86-56, 50-391/86-53, Failure to Inspect Category I and I(L) Locally Mounted Instrument Bolting

This item involved the installation of Seismic Category I and I(L) locally mounted instruments in Category I structures without all required inspections being performed. Missed inspections included inspection and testing of bolt anchors set in hardened concrete, visual inspection of attachment to imbedded features, and bolt and gap inspection for bolt anchor assemblies.

The licensee determined that the deficiencies resulted from misinterpretation of a note on the installation drawing which stated, "pull test not required" (taken to mean, "no QC tests required"), and the failure of Nuclear Construction Engineering to recognize and incorporate quality control procedures into the work items.

The licensee revised and replaced the applicable procedures to correct the deficient condition. These were reviewed by the inspector and determined acceptable relative to recurrence controls and adequate for construction restart. This item will remain open pending completion of the remaining activities.

ddd. (Open) URI 391/86-21-04, Control of Qualified Replacement Parts

This item involved procedural failure to assure equipment repair/replacement parts were suitable for their intended purpose when procured other than as identical spares and not within the scope of an approved Appendix B, QA Program. The area discussed was electrical devices substituted as equivalent replacement parts.

The licensee developed a CAP and a RIP to correct the deficiency. SSPs-10.01 and 10.05 were implemented to detail the requirements for future procurement and for identifying and establishing the necessary quality and technical requirements. These corrective measures appear adequate to ensure purchase of qualified replacement parts and control to preclude recurrence of the deficiency for construction restart activities. However, this item remains open pending licensee completion of ongoing actions associated with the RIP.

eee. (Open) VIO 50-390/91-18-05, Failure to Follow Procedures and Inadequate Procedures in the Areas of Drawing Control, Document Control and Training

This violation involved several examples of failure to follow procedure and inadequate procedures. Examples included: controlled drawings were abandoned in the plant, controlled drawings were not properly maintained at stations, QC inspectors were using uncontrolled drawings not properly marked for field work, and training for QC personnel on use of controlled drawings was inadequate. The licensee determined the violations occurred as a result of inadequate procedural guidance and inadequate training on procedures.

The licensee revised the applicable Site Standard Practices for document control, controlled drawings, records management and training to correct procedural guidance and deficiencies in the subject area. Training of site personnel on the revised procedures is in progress.

These procedures and actions were reviewed by the inspector and determined acceptable for recurrence controls and adequate for

construction restart. This item will remain open pending completion of actions committed by the licensee.

fff. (Open) CDR 390/86-33, Failure to Reduce Tubing Spans With Insulation or Concentrated Weights

This deficiency report concerned the installation of Category I(L) instrument tubing lines without reduced support spans for tubing with concentrated weights and for 1-1/2 inch radiation monitoring system tubing which is insulated and/or has concentrated weights. The licensee determined the cause of the deficiency to be a misunderstanding of design output drawings and inadequate coordination of design reviews relative to Category I(L) tubing supports.

To correct the deficient condition, the licensee issued an ECN 6047 to revise hanger drawings to clearly emphasize reduced support spans for Category I(L) tubing and tubing in the Auxiliary and Shield Building where applicable. Revision 1 to NEP-3.3, Internal Interface Control, established increased controls for transfer of design information between TVA organizations.

The inspector reviewed the above actions and determined that those relative to recurrence controls were adequate for construction restart. However, the remaining actions of field inspection to the new criteria and rework to resolve construction deficiencies cannot be performed until construction restart is authorized. Therefore, this item will remain open pending completion of the required work.

ggg. (Open) CDR 390, 391/91-17, Tuf-Loc Sleeve Bearings Found in General Electric 6900 volt Breaker Operating Mechanisms

This issue involved the use of Tuf-Loc bearings found in the operating mechanisms in the GE 6900 Volt breakers which had been identified via a GE Service Advise Letter dated April 4, 1979, to be inferior to the aluminum-bronze type bearings. The breakers in question were returned to the vendor to have the Tuf-Loc bearings replaced with the aluminum-bronze which consisted of approximately 190 circuit breakers, 68 were utilized in Class 1E applications.

The 3 breakers identified in 1991 were part of the 190 that were sent to GE to have the Tuf-Loc bearing material changed out. A follow-up investigation by the licensee revealed that vendor had not performed the change-out as required. The discrepancy was determined by the vendor to be a result of the close-out of the operation at their Philadelphia, Pennsylvania, facilities and a deterioration of the quality of the GE workmanship at that facility. Since that time, GE has moved this operation to their Chamblee, Georgia, facility and has an improved quality program that requires documentation of the disassembly, repair/overhaul, and reassembly of circuit breakers on approved instructions.

The licensee has received from the vendor an evaluation that operation of the breakers with the Tuf-Loc bearings is acceptable for up to 2000 cycles. Based on this evaluation, MI-57.1, 6900 Volt Circuit Breaker Inspection has been implemented to require breaker teardown and inspection to replace the Tuf-Loc bearings after 1800 operating cycles. Provisions were implemented to ensure that each cycle has been counted and the MI is reviewed by responsible individuals.

Based on the corrective actions implemented by the licensee to address the issue, this item is satisfactory for restart of construction activities.

4. Exit Interview

The inspection scope and findings were summarized on November 15, 1991, with those persons indicated in paragraph one. The inspectors described the areas inspected and discussed in detail the inspection results listed below. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection. Dissenting comments were not received from the licensee.

Item Number	Status	Description and Reference
390/79-BU-02 391/79-BU-02	Open	BU - Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts (Paragraph 3.jj)
391/81-25	Closed	CDR - Retrievable Valve Information Used in Piping Analysis (Paragraph 3.qq)
391/81-39	Closed	CDR - Valve Modeling Error (Paragraph 3.kk)
390/82-80	Open	CDR - Shielded Power Cable Bend Radius Deficiency (Paragraph 3. o)
391/83-23	Open	CDR - Spacing and Clearance of Sprinkler Heads in the HPFP System (Paragraph 3.rr)
390/83-46 391/83-45	Open	CDR - Improper Routing of Radioactive and Nonradioactive System Instrument Lines (Paragraph 3.zz)
390/83-49	Open	CDR - Lugs Welded to Spiral
391/83-47		Welded Pipe (Paragraph 3.h)
390/85-19 391/85-18	Open	CDR - Fire-Rated Penetration Assemblies Deficiencies (Paragraph 3.11)

390/85-31	Open	CDR - Incorrect Equipment
391/85-30	Open	Cable Terminations In Harsh Environments (Paragraph 3.ss)
390/85-35	Open	CDR - Instrumentation Branch Lines That May Not Be Qualified (Paragraph 3.mm)
390/85-36	Open	CDR - Support of Conductors
391/85-35		Inside Vertical Conduit Runs (Paragraph 3.v)
390/85-38 391/85-37	Open	CDR - AMP PIDG Terminal Lugs (Paragraph 3.m)
390/85-43 391/85-42	Open	CDR - Questionable Compression Fittings on Instrumentation Tubing (Paragraph 3.yy)
391/85-43-01	Open	VIO - Failure to Provide Adequate Procedures and Failure to Follow Procedures for Housekeeping and Preventive Maintenance of Safety-related Equipment, Components, and Systems (Unit 2 only) (Paragraph 3.aaa)
390/85-50 391/85-49	Open	CDR - Inadequate Slope on Instrument Sensing Lines (Paragraph 3.tt)
390/85-51 391/86-06	Open	CDR - As Constructed Drawing Deficiencies (Paragraph 3.nn)
390/85-53 391/85-50	Open	CDR - Incorrect Cable Terminations for Class 1E Applications in Harsh Environments (Paragraph 3.xx)
390/85-54 391/85-51	Open	CDR - Improper Use of Cables Inside Containment (Paragraph 3.uu)
390/85-59 391/85-55	Open	CDR - Flooding in Category I Structures Outside Containment (Paragraph 3.a)
390/86-14-01 391/86-14-01	Closed	URI - Review of EDG Logic Circuitry (Paragraph 3.i)
391/86-21-04	Open	URI - Control of Qualified Replacement Parts (Paragraph 3.ddd)

390/86-22	Open	CDR - Incorrect Use of Typical Supports On Instrument Sense Lines (Paragraph 3. ff)
390/86-27 391/86-23	Open	CDR - Flexible Conduit Not Installed to Compensate for Thermal and Seismic Movements (Paragraph 3. bbb)
390/86-33	Open	CDR - Failure to Reduce Tubing Spans with Insulation or Concentrated Weights (Paragraph 3. fff)
390/86-50 391/86-47	Open	CDR.- Standby D/G Design Deficiency (Paragraph 3. i)
390/86-54 391/86-52	Open	CDR - Deficiencies with HVAC DUCT Seismic Design Criteria (Paragraph 3. ee)
390/86-56 391/86-53	Open	CDR - Failure to Inspect Category I and I(L) Locally Mounted Instrument Bolting (Paragraph 3. ccc)
390/86-59 391/86-59	Open	CDR - Qualification of ASCO Solenoid Valve Conduit Connector Configuration (Paragraph 3. dd)
390/87-01 391/87-01	Open	CDR - Inadequate Support Shown on Typical Valve Support Drawings (Paragraph 3. x)
390/87-10-01 391/87-10-01	Closed	URI - Design Control of Modifications (Paragraph 3. t)
390/87-10-02	Open	URI - Use of Stick-On Electrical Wiring Fasteners (Paragraph 3. bb)
390/87-11 391/87-11	Open	CDR - Failure to Coordinate Solenoid Valve Replacement Documents (Paragraph 3. z)
390/87-11-02	Open	VIO - Failure to Control Lifted Cables and Wires Per Approved Procedures or Drawings (Paragraph 3. c)
391/87-19-03	Open	VIO - Failure to Perform Welding In Accordance With ASME Code Section IX (Paragraph 3. cc)
391/87-19-05	Closed	URI - Non Safety Related Cable in Contact with Two Division Runs of Safety Related Cable (Paragraph 3. y)

390/88-01-02	Open	VIO - Cable Tray Installation (Paragraph 3.f)
390/89-01	Open	CDR - Deficiency in the Design of the Emergency Gas Treatment System (EGTS) (Paragraph 3.e)
390/89-02 391/89-04	Open	CDR - Support of Class 1E Cables Installed In Long Vertical Cable Tray Runs (Paragraph 3.v)
390/89-06 391/89-06	Open	CDR - Inadequate Qualification of Cable Tray Supports and Fittings (Paragraph 3.f)
390/89-07	Open	CDR - Seismic Retention Clamp Bars for Safety Related Instrument Racks (Paragraph 3.d)
390/89-07-03	Open	URI - Electrical Cable Separation Deficiencies (Paragraph 3.b)
390/89-08 391/89-08	Open	CDR - Kapton Insulation Penetration Pigtail Damage (Paragraph 3.s)
390/89-200-08	Open	IFI - Lack of Protection for Installed Penetration Leads (Paragraph 3.q)
390/89-200-11	Closed	IFI - QC Records Inadequate for Inspecting Wiring in Control Room Panels (Paragraph 3.gg)
390/89-200-24	Closed	IFI - Undersized Vendor Welds on Tanks, Heat Exchangers, and Filters (Paragraph 3.oo)
390/89-200-28	Open	IFI - Bolts For Connections Not Meeting AISC Requirements For Torque (Paragraph 3.hh)
390/89-200-39	Closed	IFI - Inadequate Coordination of All On-Site Corrective Action Programs (Paragraph 3.pp)
390/89-200-40	Open	VIO - Criterion X - Inadequate Inspection Activities (Paragraph 3.ii)
390/89-200-41	Open	VIO - Criterion VII - Inadequate Inspection Procurement Activities (Paragraph 3.ww)

390/90-03	Open	CDR - Cable Proximity to Hot Pipes (Paragraph 3.p)
390/90-12-01	Closed	URI - Quality of Site Approved Procedures (Paragraph 3.g)
390/90-19-03 391/90-19-03	Open	URI - Implementation of Adequate Trending for CAQs (Paragraph 3.1)
390/90-30-03	Closed	URI - Backdating Workplan Data Sheets (Paragraph 3.aa)
390/91-02-01 391/91-02-01	Open	VIO - Instrument Lines Slope and Unistrut Clamp Installation Do Not Meet Drawing and Procedure Requirements (Paragraph 3.vv)
390/91-03-02 391/91-03-02	Open	URI - Applicability of Generic Reviews for WBN (Paragraph 3.k)
390/91-08 391/91-08	Open	CDR - Deficiency in the Intake Pumping Station and Diesel Generator Building Environmental Control Systems (Paragraph 3.u)
390/91-12 391/91-12	Closed Open	CDR - Undersized Component Cooling System Instrumentation for RCP Thermal Barriers (Paragraph 3.w)
390/91-17 391/91-17	Open	CDR - Tuf-Loc Sleeve Bearings Found in General Electric 6900 volt Breaker Operating Mechanisms (Paragraph 3.ggg)
390/91-18 391/91-18	Open	CDR - Deficiency in RVHVS Piping Stress Analysis (Paragraph 3.n)
390/91-18-05	Open	VIO - Failure to Follow Procedures and Inadequate Procedures in the Areas of Drawing Control, Document Control and Training (Paragraph 3.eee)
390/91-19 391/91-19	Open	CDR - Class 1E Teledyne Cable (Paragraph 3.r)
390/91-22	Open	CDR - Deficiencies with HVAC Duct Supports (Paragraph 3.j)

5. List of Acronyms

ABCSM	Adhesive Backed Cable Support Mounts
ACP	Administrative Control Programs
AFW	Auxiliary Feedwater
AI	Administrative Instruction
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
BFN	Browns Ferry Nuclear Plant
BU	Bulletin
CAI	Construction Administrative Instruction
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAQR	Condition Adverse to Quality Report
CAT	Construction Assessment Team
CATD	Corrective Action Tracking Document
CEB	Civil Engineering Branch
CCD	Configuration Controlled Drawings
CCP	Centrifugal Charging Pump
CCS	Component Cooling System
CDR	Construction Deficiency Report
CEP	Construction Engineering Procedure
CGG	Construction General General
CFR	Code of Federal Regulation
CPI	Construction Process Instruction
CRD	Control Rod Drive
CRDR	Control Room Design Review
CS	Containment Spray
DBVP	Design Baseline Verification Program
DCN	Design Change Notice
DCR	Design Change Request
DG	Diesel Generator
DS	Design Standard
EAI	Engineering Administrative Instruction
ECN	Engineering Change Notice
EDG	Emergency Diesel Generator
EEB	Electrical Engineering Branch
EGTS	Emergency Gas Treatment System
EMS	Equipment Management System
EQ	Environmental Qualification
EQCS	Environmental Qualification Change Supplement
EQIS	Equipment Information System
EQP	Equipment Qualification Project
ER	Engineering Requirement
ERCW	Essential Raw Cooling Water
FCR	Field Construction Revision
FPI	Fire Protection Instruction
FSAR	Final Safety Analysis Report

FT	Flow Transmitters
GCI	General Construction Instruction
GE	General Electric Company
GET	General Employee Training
GSPS	Generating Station Protection System
HAAUP	Hanger and Analysis Update Program
HELB	High Energy Line Break
HPFP	High Pressure Fire Protection
HVAC	Heating, Ventilating and Air-Conditioning
IC	Instruction Change
IFI	Inspector Follow-up Item
IMI	Instrument Maintenance Instrucion
IR	Inspection Report
ISI	Inservice Inspection
JTG	Joint Test Group
LII	Licensee Identified Item
LOCA	Loss of Coolant Accident
MAI	Modifications/Additions Instruction
MELB	Moderate Energy Line Break
MIC	Microbiological Induced Corrosion
MKW	Morris Knudsen
MR	Maintenance Request
MVSR	Miscellaneous Valve Status Report
NCO	Nuclear Central Office
NCR	Nonconformance Report
NE	Nuclear Engineering
NEC	National Electrical Code
NEP	Nuclear Engineering Procedure
NPFA	National Fire Protection Association
NPP	Nuclear Performance Plan
NQAM	Nuclear Quality Assurance Manual
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
NUC PR	Nuclear Power
OC	Office of Construction
OIE	Office of Inspection and Enforcement
OIWL	Outstanding Items Work List
PDT	Pressure Differential Transmitter
PER	Problem Evaluating Report
PM	Preventive Maintenance
PMP	Preventive Maintenance Procedure
PMS	Preventive Maintenance System
PMT	Post Maintenance Testing
PSI	Pounds Per Square Inch
PSIG	Pounds Per Square Inch Gauge
QA	Quality Assurance
QCI	Quality Control Instruction
QCP	Quality Control Procedure
QEB	Quality Engineering Branch
QIR	Quality Information Request
QMI	Quality Methods Instructions

QMP	Quality Methods Procedure
RC	Reactor Coolant
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RIMS	Records Information Management System
RIP	Replacement Items Program
RVHVS	Reactor Vessel Head Vent System
SCA	Significant Corrective Action
SCAR	Significant Corrective Action Report
SCR	Significant Condition Report
SDITS	Stress Design Input Tracking System
SER	Safety Evaluation Report
SIS	Safety Injection System
SMPL	Site Master Punch List
SPEC	Specification
SQN	Sequoyah Nuclear Plant
SR	Service Request
SRN	Specification Revision Notice
SSER	Supplemental Safety Evaluation Report
SSP	Site Standard Procedure
STD	Standard
TAC	Temporary Alteration Control
TEST	TVA Estimated & Schedule Tracking
TS	Technical Specification
TVA	Tennessee Valley Authority
UNR	Unresolved
URI	Unresolved Item
VIO	Violation
WB	Wedge Bolt
WBEB	Watts Bar Engineering Branch
WBEP	Watts Bar Engineering Procedure
WBP	Watts Bar Plant
WBN	Watts Bar Nuclear Plant
WBRD	Watts Bar Reportable Deficiency
WBSCA	Watts Bar Significant Corrective Action
WCG	Work Control Group
WD	Wiring Diagram