



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

Report Nos.: 50-390/89-02

Licensee: Tennessee Valley Authority
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 1101 Market Street
 Chattanooga, TN 37402-2801

Docket No.: 50-390

License No.: CPPR-91

Facility Name: Watts Bar Unit 1

Inspection Conducted: February 13-17, 1989

Inspectors:	<u><i>X. Barr</i></u>	<u>4/26/89</u>
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SUMMARY

Scope: This was a special, announced team inspection to assess the Vertical Slice Review (VSR) program of the licensee's contractor, Sargent and Lundy Engineers, (S&L) Chicago, Illinois, and TVA's responses and documentation of the findings. The efforts in this second VSR inspection concentrated on the closure process and the adequacy of closure for those Discrepancy Reports (DRs) which remained to be resolved by TVA as reported in IR 50-390/88-09. Additionally, new

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areas of focus relative to specific DRs were reviewed. These included additional checklists and any associated DR, Resolution Reports (RR) and Closure Reports (CR) for selected topics in the Engineering Verification (EV), Construction Verification (CV) and Records Verification (RV) areas. Also, the functions and actions of the Internal Review Committee were reviewed. A preliminary review was conducted of the methodology being used by S&L to execute trending analysis with the VSR data. The latter effort is being used to form the basis of the final report from S&L to document the results and conclusions from the VSR. This inspection also included review of a Quality Assurance audit performed by TVA personnel, qualifications of the auditors and Part 21 program compliance.

Results: This team inspection concluded that the contractor's implementation of the defined program for assessing the design adequacy of the selected systems is adequate. The inspection also confirmed the contractor's documentation and transmittal of results to TVA is adequate. The trending analysis and final resolution of the results were not evaluated at this time because S&L has not completed these activities.

Attachment 1 identifies the DRs reviewed by the team and indicates the significance determination made by the VSR.

Within the area inspected, the following violation was identified:

- VIO 390/89-02-01: Failure to issue CAQRs as required by TVA's Nuclear Quality Assurance Manual, paragraphs 7, 8, and 10.

Two unresolved items* were identified involving TVA's method of documenting nonconformances on PRDs instead of CAQRs, paragraph 9, and calculating all loads on concrete slabs, paragraph 10.

This inspection also identified that, due to the large number of calculations being regenerated, it will be difficult for S&L to reach a final conclusion on whether the systems would function adequately as installed. This may also indicate the need for TVA to perform system level functional assessments following completion of the calculation generation effort.

*Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *E. B. Branch, S&L Internal Review Committee
- *F. E. Denny, TVA Senior Engineer Specialist
- *B. A. Erler, S&L Project Director
- *R. C. Heider, S&L Project Manager
- *W. Horn, TVA Watts Bar Program Team
- *O. A. Hrynewych, S&L Project Manager Engineering Verification
- *R. L. Humphreys, S&L Construction Verification & Records Verification
- *R. B. Johnson, S&L QA Coordinator
- *P. R. Mandava, TVA Project Manager
- *C. Riedl, TVA Licensing Engineer
- *S. Taylor, S&L Chairman, Internal Review Committee

*Attended exit interview

Other personnel contacted included S&L engineers.

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

2. Status of VSR Program

The inspector reviewed the completion status of the total VSR program. The following list represents the status as of February 13, 1989.

Total number of discrepancy reports issued by the S&L review - 654.

Total number of closure reports issued by S&L - 622.

Total number of discrepancy reports that were determined to be non-discrepant - 154.

Total number of discrepancy reports determined by S&L and TVA to be discrepant - 468.

Total number of discrepancies that were determined to be previously identified by TVA - 237.

Total number of discrepancies that were determined to be VSR identified - 231.

Total number of discrepancies for which significance has not yet been determined - 137.*

*Note: This number represents approximately 29% of the total valid discrepancies. In the majority of the DRs which state that

significance has not been determined, TVA stated in the DRs: "TVA has decided that the collective evaluations for significance of this type of DR at this point in the incompleting design and construction of WBN is not cost effective. This decision is based on the fact that TVA has a predefined (prior to starting the VSR) program to identify and correct all discrepancies that could be design or safety significant." The DRs that include this position are generally those which reference a Corrective Action Program (CAP) for resolution. Prior to S&L's reaching their overall conclusion regarding the VSR which is to be included in the final report due March 7, 1989, the inspector was unable to determine the acceptability of the decision made by the licensee to not complete the evaluation for significance of the discrepancies at this time.

3. TVA Quality Assurance Audit of the Vertical Slice Review

The inspector reviewed the results of a QA audit, conducted by TVA's Engineering Assurance, of the S&L activities on the Vertical Slice Review. The only internal audit performed since the NRC inspection of November 28 - December 2, 1988, was the TVA EA Audit 89P-16 of February 6 - 9, 1989. This EA audit was conducted at the S&L office in Chicago, Illinois. The purpose of the audit was to:

- a. Follow up on open items identified in Audit 88P-91 including effectiveness of implementation of the corrective action plan that resulted from audit 88P-01.
- b. Review revisions to the VSR plan, and completed work.
- c. Review the effectiveness of the DR, RR, and CR resolution process.
- d. Review S&L's trend analysis activities.
- e. Review S&L's preparation of the final report.
- f. Review the VSR QA requirements.
- g. Review the VSR protocol.

The TVA audit resulted in the closure of the 88F-91 open items. The licensee's audit included a review of 15 packages to ensure completeness and technical accuracy. Only a few minor reference errors were noted. The TVA audit also identified a problem with tracking observation reports which was subsequently corrected by S&L. TVA identified a lack of audit coverage for internal audits conducted by S&L and S&L committed to performing an additional audit, beginning either on February 27, 1989, or March 6, 1989. The licensee has committed to a review of the results of this S&L audit, which will include a review of the trending analysis and the final VSR report. The licensee's audit did not cover these because

S&L work had not progressed to a point where objective evidence was available. The TVA audit identified a concern with the lack of a turnover plan. The inspector discussed this with the responsible S&L staff and determined that preparation of the plan is underway. The licensee's audit reviewed the VSR protocol and found that the protocol was acceptably implemented. The licensee's audit questioned the requirement for maintaining S&L records until the Unit 2 operating license is issued. TVA is reviewing this issue.

The inspector reviewed the qualifications of the TVA EA auditors who performed Audit 89P-16 of the S&L VSR in Chicago on February 6 -9, 1989. The Certification of Auditors Qualifications for the auditors showed that they were qualified to perform this audit.

The inspector found the licensee's audit and audit personnel qualifications acceptable.

4. 10 CFR 50, Part 21 Compliance

The inspector reviewed the TVA contract with S&L to determine whether 10 CFR Part 21 requirements were specified in the contract. The inspector's review found that the contract imposed Part 21 requirements. In addition, the inspector reviewed S&L QA Procedures Manual, Revision 1, dated June 13, 1986, to determine whether Part 21 provisions are adequately covered. S&L General Office Procedure B-14 provides adequate procedures for dealing with Part 21 issues. A S&L representative informed the inspector that no Part 21 reports were made. The inspector also noted that none of the reviews done by NRC identified any items for which a Part 21 report was required. The inspector found that Part 21 was adequately addressed programmatically for the contractor's effort with the VSR.

5. Internal Review Committee

The inspectors met with the Internal Review Committee (IRC) to determine the role of the IRC and the adequacy of its performance. The IRC is comprised of the head of the S&L Quality Assurance Division and three Design Directors (Mechanical, Structural, and Electrical). The IRC reviewed all observation reports to determine if they were discrepancies. The IRC prepared a DR as appropriate for transmittal to TVA. TVA was required to determine the design/safety significance of the discrepancy and prepare a RR. The IRC reviewed the RR in parallel with the project team and provided acceptance or rejection of the proposed determination and/or resolution. Upon acceptance of the RR, the IRC prepared a Completion Report (CR) which was forwarded to the licensee.

The IRC was involved in the development of the VSR program, including system selection, sample size, etc. It had sufficient independence to expand the sample if it was deemed necessary. An example of this is in the area of miscellaneous loads supported from cable tray supports. Although not a part of the original sample, the IRC expanded the sample to include the area of miscellaneous loads.

The IRC periodically met with TVA to facilitate a total understanding of the DRs and to discuss unacceptable resolution reports. The inspectors saw numerous examples of revised resolution reports which contained a different safety or design significance determination and revised corrective action. The IRC stated that although no new CAPs were generated as a result of the VSR, several CAPs were refined or expanded. When CAPs were referenced in a RR, the IRC looked at the CAP to ensure that the scope covered the issue. The IRC did not review the technical adequacy of the CAPs. Also, the IRC did not review TVA's determination of whether a discrepancy was previously identified or identified through the VSR.

The inspectors concluded the IRC functioned adequately and met the objectives of the VSR program.

6. Review of Records Verification

The inspector randomly selected five discrepancy reports generated by the Records Verification portion of the VSR to assess the adequacy and resolution of the findings.

Discrepancy Report 442, Checklist MRV-1403-002

DR 442 was prepared to address a Receiving Inspection Checklist for a check valve which was not filled out in its entirety and was unsigned and undated. TVA prepared a CAQR which describes a reconstruction of the deficient record. The resolution report stated that corrective action for other discrepancies of this type would be covered by the Quality Assurance Records Corrective Action Program (CAP) plan.

The inspector noted that this CAQR is not listed in the CAP, however, TVA has been requested (in a meeting on this CAP in Rockville, MD on February 8, 1989) to list all CAQRs which are covered by a CAP in an attachment to the CAP.

Also, the inspector informed S&L that, based on a preliminary review of this CAP, the staff has identified problems with the corrective actions identified in the CAP. This does not affect the particular deficiency identified in DR 442 because appropriate corrective action was identified in the CAQR. The inspector was informed that the scope of the CAP will be expanded to cover deficiencies in this type of record. The Internal Review Committee's review of the CAP did not address its adequacy, only that the scope of the CAP will cover this type of deficiency. S&L anticipates that NRC will review the CAPs to ensure corrective actions are adequate.

The inspector determined the S&L position relative to resolving the issue is adequate.

Discrepancy Report 24, Checklist SRV-0302-003

Discrepancy Report 24 had several subparts, one of which dealt with inspector qualification. TVA performed an additional audit of inspector

certification records and adequately addressed this issue. The DR also identified that the wrong revision of an attachment to the Quality Control Procedure (QCP) was used. The support identified in the DR was re-inspected, however, it was not clear that the issue of using an incorrect revision of a QCP was generically addressed. S&L staff provided additional information which showed that the corrective action identified in the Resolution Report covered this issue although it was not very explicitly stated. Also, the Completion Report generally stated that corrective action was acceptable. The licensee indicated that CAQR WBP 870036 should be revised to include this issue. The inspector considers this DR to be satisfactorily resolved subject to the revision of the CAQR.

Discrepancy Report 29, Checklist ERV-0408-005

DR 29 identified a record problem in that a TVA drawing identified four 6.9 KV transformers as Class 1E, however, there was no evidence of installation inspections for these transformers. TVA responded that although these transformers were procured as Class 1E, they are being used to perform non-safety-related functions. TVA reviewed twelve additional drawings to determine if any other drawings contained this type of deficiency and none were identified. TVA was asked how the sample size was determined. The response was that the sample included all of the drawings which include 6.9 KV transformers. The drawing will be revised to correctly depict the safety classification of the transformers.

S&L accepted this resolution and the inspector agrees with this determination.

Discrepancy Report 423, Checklist MRV-1510-003

DR 423 identified a TVA inspector who did not meet the certification requirements for receipt inspections. Also there were no training records for the inspector. TVA provided evidence of the inspector's certification which was in effect at the time he signed the receiving Inspection Checklist. The CR accepted this as a non-discrepant observation. The inspector finds this acceptable.

Discrepancy Report 410, Checklist SRV-1702-001

DR 410 identified a TVA inspector who signed a receipt inspection form and did not meet certification requirements for signing receipt inspections. TVA provided evidence in the RR that the inspector was authorized to sign the form in question. The S&L CR accepted TVA's determination that this was a non-discrepant observation. The inspector finds this acceptable.

7. Review of Construction Discrepancy Reports and Associated Documentation

The inspector selected eight discrepancy reports generated by the Construction Verification portion of the VSR for review to assess the adequacy and resolution of the findings.

Discrepancy Report 98, Checklist MCV-0704-007

This DR identified that Radiation Monitor 1-RR-90-123 did not have units of measurements marked on the instrument face. It was identified by S&L due to the meter being marked with non-permanent marking on the instrument face. The inspector agreed with TVA's RR which indicated that markings are not a requirement on the instrument face and this is a non-discrepant condition as defined by the VSR program. This item will also be readdressed by TVA during the Control Room Design Review (CRDR) effort currently underway at Watts Bar.

The inspector considers this DR and the licensee's planned corrective actions acceptable.

Discrepancy Report 437, Checklist SCV-0301-014

This DR identified that grouted anchor spacing violates the spacing requirements of TVA Construction Specification G-32, Revision 12 and the minimum edge distance between the grouted anchors and the edge of the column is in violation of the minimum edge distance specified in G-32, Revision 12.

The licensee identified the root cause of the discrepancy as lack of emphasis on maintaining and controlling documentation of construction identified field changes which resulted in modifications, that were not approved, being incorporated into design drawings.

The licensee responded in the RR that these discrepancies have been previously identified by the CAP on Category 1 Cable Tray and Cable Tray Supports, Revision 0.

The CR states the CAP developed by the licensee is an acceptable resolution. Additionally, the CR states the significance of the discrepancy is not determined because the CAP has not been implemented.

The inspector's review of the referenced CAP revealed the CAP fails to reference any CAQR that previously identified the item. The licensee subsequently advised the inspector that a CAQR should have been issued on this item. On February 21, 1989, CAQR 890083 was issued to address the discrepancies. The licensee stated in the CAQR that the above two conditions were documented on a Design Change Notice (DCN) and should have also been documented as a CAQR. The licensee stated other DCNs may also have been inappropriately dispositioned.

As contained in the licensee's Nuclear Quality Assurance Manual, Part 1, Section 2.16, "Corrective Action", paragraph 2.I (c), CAQRs shall be generated for items discovered during in-process work activities that require repair or accept-as-is disposition. Failure to comply with this requirement is identified as a violation of 10 CFR 50, Appendix B, Criterion II, "Quality Assurance Program", which specifies: "The applicant shall establish ... a quality assurance program This program shall ... be carried out throughout plant life in accordance with

those policies, procedures, or instructions. This violation is identified as 50-390/89-02-01, "Failure To Disposition Nonconformances As Required By The Nuclear Quality Assurance Manual".

With the exception of the failure to issue a CAQR, the inspector found the activities associated with the DR, RR, and CR were adequate.

Discrepancy Report 489, Checklist SCV-0901-012

This DR identified through field inspection of an instrument support that the installed condition of a base plate is 1/2 inch thick and the base plate, by design, should be 5/8 inch thick. Also, due to warpage of the associated unistrut during welding, the lips of the unistrut do not engage the grooves of the unistrut springnut.

The licensee's RR states that these are valid discrepancies which were previously identified by the licensee and the discrepancies are bounded by the Hanger And Analysis Update Program (HAAUP) CAP and/or the Instrument Line CAP.

The S&L CR report indicates the licensee's resolution by implementation of the CAP is acceptable. However, the significance of the discrepancy is not determined because the CAPs have not been implemented.

TVA's position on the DR was acceptable to S&L. S&L concluded that proposed future actions would be acceptable after implementation. The inspector agrees with the resolution of this DR and notes that future implementation of the CAP will determine the safety significance of this item.

Discrepancy Report 599, Checklist ECV-0101-026

This DR dated October 17, 1988, was issued based on review of checklist ECV-0101-026. This checklist was prepared to determine the adequacy of cable installation. Based on the checklist, the DR identified problems with flexible conduit installation and also with cables outside the cable tray.

TVA submitted Revision 1 of the RR, dated January 7, 1989, which classified the issues as a previously identified discrepancy and as a design significant condition. TVA issued an MR to tighten the loose conduit fitting and indicated on the RR that the generic condition will be resolved by the electrical issues CAP. TVA has also issued CAQR WBP 880764P to correct the discrepancy of installing a collar without space limitation. DCN C-02586-A will revise G-40 to remove the space requirement for the collar.

For the cables outside the cable tray, TVA has issued an MR to reinstall these cables inside the cable trays. TVA reviewed 20 cable tray nodes and found only one tray had a cable outside the tray and determined it to be an isolated case.

CR, Revision 1, dated January 17, 1989, documents the acceptance of the RR by S&L.

The inspector's review found the activities associated with this DR, RR, and CR were adequate. However, the inspector questioned the classification of the discrepancies as TVA identified since some of the discrepancies were not previously identified. Based on this, a S&L lead engineer reviewed other similar CRs and determined that only this CR was incorrectly classified and reissued the CR to correctly identify the deficiencies as both previously identified and VSR identified deficiencies. Based on this, the inspector considers this classification item resolved. The inspector also questioned the acceptability of sampling 20 cable tray nodes for the cables found outside of trays. S&L's response was that their acceptance was based on their walkdown which represented a large number of nodes and not the walkdown of the 20 additional nodes performed by TVA. The inspector considers the S&L judgment of the RR reasonable and the item closed.

Discrepancy Report 603, Checklist ECV-0101-006

This DR, dated October 17, 1988, was issued based on checklist ECV-0101-006. This checklist was prepared to determine the adequacy of cable installation. The DR identified that (a) cable schedule summary does not adequately represent the route in the field and (b) plastic insulating ring of the bushing is missing at the end of 1 PM 6330B which is located inside box 4265.

TVA submitted Revision 1 of the RR, dated January 7, 1989, which identified the discrepancy as a previously identified discrepancy and as a design significant condition. TVA has issued CAQR 880762 to identify the specific deficiency. Item (b) was determined to be a non-discrepant item because it met the alternate criteria of the applicable G-40 Specification.

CR, Revision 1, dated January 17, 1989, documents the acceptability of the RR by S&L.

The inspector's review found the activities associated with the DR, RR, and CR were adequate.

Discrepancy Report 587, Checklist MCV-1515-006

This DR identified through field inspections that installed motor operated valves 1-FCV-70-26B, 27B, 92A, 143A, and 1-FCV-34B are mounted in a position which is contrary to the design drawing requirements. The licensee responded in the RR that this issue is a previously identified discrepancy and is bounded by the HAAUP CAP.

The inspector's review of the HAAUP CAP found similar issues are discussed in the CAP. However, the specific item is not identified in the CAP or on a CAQR. As specified in NQAM, Part 1, Section 2.16, "Corrective Action", Paragraph 2.1.2, a CAQR is required for failure of the approved design to

comply with engineering input documents, licensing, or regulatory commitments. Failure to issue a CAQR is a second example of Violation 390/89-02-01. With the exception of the failure to issue a CAQR, the inspection found the activities associated with this DR were adequate.

Discrepancy Reports 95 and 430, Checklist MCV-0704-002

These DRs identified the failure to properly install seismic clamp bars on components in instrument racks 1-R-127 and 1-R-131. The instruments were required as part of the Bailey seismic qualification to be mounted using clamp bars. TVA's investigation determined that additional racks were also affected. The TVA RR indicated that this item would have been identified by the Equipment Seismic Qualification CAP and, therefore, the item was considered previously identified.

At the time of initial discovery (September 29, 1988) S&L issued an OR (201). This was followed by the second OR (568) on October 13, 1988. On October 18, 1988, TVA documented the discrepancy on CAQR WBP 880636. At that time, the reviewer checked "NO" on the following items: 1) Potentially affects operability; 2) Potentially reportable; 3) Generic review required. Approximately two months later on December 16, 1988, the CAQR was revised and the reportability and operability blocks were marked "YES". On December 9, 1988, Sequoyah entered a Technical Specifications Action Statement for inoperable equipment and a TACF was implemented to temporarily strap the instruments in the panels. The failure to properly assess the impact of the CAQR on October 18, 1988, resulted in an approximate two-month period of potentially inoperable equipment on a TVA operating plant. This improper assessment of operability/reportability resulted in the failure to immediately notify the potentially affected operating plant (Sequoyah) as required by Section 2.13 of the NQAM. Additionally, on February 12, 1988, as a result of an NRC audit at Sequoyah of the CAQR process, the Manager of Nuclear Power issued a directive which required an additional management level review of all CAQRs for operability and reportability as well as generic implications. This directive applied to all active TVA sites. This added review was not performed on CAQR WBP-880636 as required by the directive. The failure to properly implement the CAQR process and to immediately notify the potentially affected unit of a nonconforming condition is a third example of Violation 89-02-01.

With the exception of the failure to issue a CAQR, the inspector found the activities associated with the DR, RR and CR were adequate.

8. Review of Mechanical Engineering and Instrumentation Verification and Associated Documentation

The inspector randomly selected four discrepancy reports generated by the Mechanical and/or Instrumentation Engineering Verification portion of the VSR for review to assess the adequacy and resolution of the findings.

Discrepancy Report 15, Checklist MEV-1401-001

This DR identified that valve 1-CKV-70-687 had been modified to include soft seats to allow better isolation and these seats could be damaged if heated above 300°F. Valve 1-CKV-70-687 is the bypass check valve around the inboard containment isolation valve 1-FCV-70-87. The functional purpose of this valve is to provide thermal relief for the piping between the inboard valve (1-FCV-70-87) and the outboard valve (1-FCV-70-90). Because this valve bypasses a containment isolation valve it also is designated as a containment isolation valve. The valve body and internal soft seat were determined to be qualified for environmental conditions associated with a design basis accident. However, during a thermal barrier heat exchanger leak, the soft seat temperature limit may be exceeded. During this event the containment isolation provision of the valve is not required and the spring check feature will allow pressure relief around the isolation valve. Therefore, the current arrangement is acceptable. S&L agreed with the TVA position on this DR and it was classified as non-design or safety significant. The inspector agrees with the resolution and had no further questions on this DR.

Discrepancy Report 42, Checklist MEV-0411

This DR is a VSR "Design Significant" discrepancy and identified that piping and valves 1-FCV-70-66, 1-RFV-70-538 and 1-RFV-70-539, constructed to ASME Section III Code and connected to the CCS Surge Tank have not been accounted for in the verification of nozzle loading and valve seismic accelerations. The analysis of these seismic category I valves and piping has not been performed per requirements of Section III, Paragraph NC-3651, WB-DC-40-31.12 and WB-DC-40-31.7.

The root cause of these discrepancies is the failure to properly implement the ECN 3721 design changes. A CAQR (WBP880785) was issued on December 14, 1988, and identifies the issue.

The licensee determined this is design significant because preliminary calculations indicated that the subject valves and the piping connected to Component Cooling Surge Tank exceeded the vendor tank allowables and that the nonseismic discharge line from the top of the tank will cause overstress of the nozzle during a seismic event. These discrepancies are not safety significant since breach of the tank boundary has no impact as it is an atmospheric tank and the connections are above the normal range of water level. The nonsafety discharge line from the top of the surge tank serves no safety function.

The licensee committed to the following action:

- a) Review all safety-related flow diagrams for equipment that requires analysis to be performed on interfacing piping and valves.

- b) Verify that interfacing piping and valves are analyzed under a rigorous or alternate analysis problem.
- c) Identify the safety-related equipment interfaces that have had no analysis performed.
- d) If analyses are not available, perform analysis on the safety-related equipment interface piping and valves to document the nozzle loadings and valve accelerations.

The conditions discussed above include the corrective actions for DR 42, 157, and 194.

The inspector considers this DR and the licensee's planned corrective actions acceptable.

Discrepancy Report 70, Checklist MEV-1403-004

This DR involved the classification of several CCS valves as containment isolation and active seismic valves. Specifically, a series of valves in the supply to the reactor coolant pump thermal barrier heat exchanger and oil coolers were questioned as to their adequacy to be designated as containment isolation and seismic active components. The three valves, in a single train's flow path, included two motor operated valves outside containment and a check valve inside containment.

The MOVs in question were the second outside isolation valve farthest from the containment for both penetrations. Their valve numbers were 1-FCV-70-133 for penetration 50B and 1-FCV-70-139 for penetration 52. The concern raised by S&L, in their observation, was that these valves were designated as containment isolation valves in the system design criteria although they were not purchased as ASME Section III Class 2 (TVA Class B) components. TVA, through their RR, performed a like component evaluation on both of the outboard MOVs and stated that the valves in question were not containment isolation but were system isolation valves required to prevent CCS inventory loss.

A review of the Watts Bar FSAR indicated that the valves in question were not listed as containment isolation valves. The penetrations are isolated by one MOV outside containment and a check valve inside containment.

This issue was determined by the licensee not to be design or safety significant.

Based on the inspector's review of DR 70, RR, & CR reports, it appears that TVA's position was acceptable to S&L and the licensee's proposed future actions would be acceptable after implementation. The inspector found the activities associated with the DR, RR and CR were generally

adequate. However, no final conclusion on technical adequacy can be reached because the issue of containment isolation is being readdressed by TVA in a CAP and the NRC will follow the licensee action on the issue.

Discrepancy Report 134, Checklist EEV-0409-001

This DR involved the failure of DNE to incorporate an FSAR and SER requirement to provide D.C. Battery Charger breaker status monitoring in the control room. Specifically, FSAR Section 8.3.1.1 states that battery charger output breaker open status is alarmed in the main control room. Additionally, in Section 8.3.2.2 of Supplement 3 to the Watts Bar SER, the NRC required as a condition to the license, that TVA, as a minimum, provide control room alarms for battery charger circuit open.

The TVA resolution report indicated that the deficiency could be resolved by changing the FSAR commitment.

Changing the FSAR commitment as stated by TVA may be an option. However, IEEE 308-1971 provides surveillance guidance which recommends that battery charger breaker position be annunciated in the main control room. Therefore, the licensee position on deleting the requirement may not be accepted by the NRC.

TVA did not consider this deficiency to be a CAQR even though the TVA NQAM states that a failure to meet a code, standard or regulatory commitment is a CAQR. Failure to issue a CAQR for this item is contrary to the licensee's NQAM, Part 1, Section 2.14, "Corrective Action", paragraph 2.1.2 (B) which specifies; a CAQR is required when the approved design fails to comply with engineering input documents, licensing, or regulatory commitments. This deficiency is not in compliance with the FSAR. The failure to identify this deficiency as a CAQR is a fourth example of Violation 89-02-01.

9. Review of Electrical Engineering Verification Activities Performed for the VSR

The inspector randomly selected seven discrepancy reports generated by the Electrical Engineering Verification portion of the VSR for review to assess the adequacy and resolution of the findings.

Discrepancy Report 183, Checklist EEV-2109-004

This DR identified that valve 1-FCV-67-458-A did not have its opening torque switch bypassed. The RR for this item stated that the valve is normally open and its active safety function is to close. The inspector reviewed the electrical diagrams of this valve's control circuit with the S&L engineer. The inspector agreed with the position stated in the RR.

During this review, the inspector determined that checklist EEV-2109-004 had been annotated that system electrical separation was being addressed

by checklist EEV-2102. However, a review of checklist EEV-2102 revealed that it did not completely address system electrical separation. A more appropriate reference on checklist EEV-2109-004 would have been EEV-2102 combined with EEV-2109-011. The S&L engineer revised the checklist to indicate this and the inspector has no further questions.

Discrepancy Report 07, Checklist EEV-0101

The DR and RR were reviewed by the inspector during the previous inspection (50-390/88-09) performed during November 28 through December 2, 1988, at the S&L offices. The licensee has since submitted a second revision to the RR which states that it is a previously identified discrepancy and its design safety significance has not been determined.

TVA is correcting this discrepancy under Cable Issues Work Package YBB000, the Cable Tray and Cable Tray Support CAP, and the Conduit and Conduit Support CAP.

Root cause of the discrepancy was identified as the failure by DNE to include required cable support requirements of the cable installation specification. The licensee has committed to revise the cable installation specification and its procedures to include these requirements to prevent recurrence of the problem.

CR, Revision 1, dated January 12, 1989, documents the acceptance of RR by S&L.

The inspector's review found the activities associated with this DR, RR, and CR were adequate. However, the licensee has only issued a PRD, WBP 880564P, to document this condition. The inspector's review of this PRD identified a concern that this item should be a CAQR. A CAQR would receive generic consideration, evaluation for effect on operating plants and a 50.55e evaluation. This item is identified as Unresolved Item 50-390/89-02-02, "Use of PRD" pending further evaluation of the PRD process by TVA and NRC.

Discrepancy Report 14, Checklist MEV-0704

This DR was also reviewed by the inspector during the previous inspection (50-390/88-09). The discrepancy identified wiring separation violations in panels. The licensee has submitted Revision 1 of the RR dated December 13, 1988. In this RR, TVA has identified the discrepancy as a previously identified discrepancy and a design significant condition. TVA has previously identified this condition under the Employee Concern Program CATD 242.00-WBN-01. Also, CAQR WBP 870927 identified a similar condition inside main control room panel O-M-12.

TVA has committed to evaluate internal panel wiring to ensure that the separation requirements are met. This activity is being done under CAQR WBP 870927 and CAQR WBP 880725. Any discrepancies identified by this inspection will be either corrected or referred to DNE for analysis.

TVA has revised the design criteria document WB-DC-30-4 to include all separation requirements for wiring inside of panels. DNE will issue a design output document and design drawings to convey these requirements to DNC to prevent the recurrence of the problem in the future.

CR, Revision 1, dated January 19, 1989, documents the acceptance of the RR by S&L.

The inspector's review found the activities associated with the DR, RR, and CR were adequate.

Discrepancy Report 81, Checklist EEV-0410-003/004

This DR was issued on September 30, 1988, based on the checklist EEV-0410-003/004. These checklists were prepared for determining the adequacy of the vital and spare instrument power (120 VAC). Based on the checklists, the discrepancy report states that (a) UPS sizing calculation is not available for review and (b) calculation listing the load requirements is not available for review.

TVA has submitted Revision 2 of the RR dated November 15, 1988, which identifies the issue as a previously identified issue with significance not yet determined.

New calculations are being generated with the issuance of a work package. Recurrence control has been implemented by the use of a change review checklist WBEP 5.62 and WBEP 5.27.

CR, Revision 0, dated November 22, 1988, documents the acceptance of the RR by S&L.

The inspector's review found the activities associated with the DR, RR, and CR were adequate based on the licensee's proposed future actions. The inspector notes that implementation of the CAP will determine safety significance.

Discrepancy Report 242, Checklist EEV-0403-003

This DR was issued on October 11, 1988, based on the checklist EEV-0403-003. The checklist was prepared for determining the adequacy of Emergency Auxiliary Power. Based on the checklist, the DR states that (a) contacts for the undervoltage and blackout relays are shown incorrectly on the drawings and (b) mylar and aperture cards for the same revision are different.

The licensee has submitted Revision 1 of RR dated January 9, 1989, which identifies the issue as a VSR identified issue, but not design or safety significant. The basis for the significance determination is the fact that for item (a), though the contact is incorrectly shown on the drawing, it is properly applied in the circuit, and for item (b), the licensee has

has issued a PRD (WBP 8807 14P, Revision 1), to correct the affected drawings. For recurrence control, the licensee has committed that the DBVP will issue configuration control drawing preparation and control procedures.

CR, Revision 1, dated January 17, 1989, documents the acceptance of the RR by S&L.

The inspector's review found the activities associated with the DR, RR, and CR were adequate. However, the inspector pointed out that the DR dated February 13, 1989, lists four observations against this checklist while the checklist only documents two. S&L agreed to revise the checklist to include all four observations.

Discrepancy Report 298, Checklist EEV-2102-001

This DR was reviewed by the inspector during the previous inspection (50-390/88-09) and identified a discrepancy in verification of electrical separation. The licensee has submitted Revision 0 of the RR, dated December 10, 1988. In this RR, the discrepancy has been classified as previously identified and design significant. This condition was previously identified by the licensee under the Employee Concern Program (CATD 242.00-WBN-01). Also, CAQR WBP 870927 identified cable separation problems internal to panels.

The licensee has committed to review separation of internal panel wiring in a work package. The corrective action in the work package will require DNC to walkdown panels to identify separation problems. Any deficiency identified by this inspection will either be corrected or referred to DNE for analysis.

CR, Revision 1, dated January 25, 1989 documents the acceptance of the RR by S&L.

The inspector's review found the activities associated with this DR, RR, and CR were adequate. However, in the RR, TVA has used the guidelines developed by the IEEE Working Group on Independence Criteria, SC-6.5 to justify the basis of safety significance. The inspector informed both S&L and TVA that this IEEE standard has not been accepted by NRC and NRC reviews will determine the acceptability of TVA's separation criteria and the IEEE criteria after the licensee submits the information to NRC.

Discrepancy Report 397, Checklist EEV-1515

This DR, dated October 14, 1988, was issued based on the checklist EEV-1515. This checklist was prepared to determine the adequacy of valve motor operators. Separate checklists were prepared for different valves. Based on the checklists, the DR states that (a) the minimum starting voltage specified (80% for motor) does not agree with the acceptable voltage drop during DG start, and (b) name plate data on many motors were not available.

TVA submitted Revision 2 of RR, dated January 30, 1989, which identified the first issue as previously identified with significance not determined while the second issue was identified as a VSR identified issue and not a design or safety significant issue.

New calculations are being generated under a work package which will determine the acceptability of the starting voltage while for item b (referenced above) TVA has either provided or will receive additional information to close the issue.

CR, Revision 1, dated February 2, 1989, documents the acceptability of the RR by S&L.

The inspector's review found the activities associated with the DR, RR, and CR were adequate. The inspector also notes that additional calculations are necessary to determine safety significance of item a.

10. Review of Structural Engineering Discrepancy Reports and Associated Documentation

The inspector continued the inspection of the VSR from IR 50-390/88-09 by followup on the four DRs which had been previously selected for review and had not been resolved previously. Other selected DRs were also reviewed.

Discrepancy Report 104, Checklist SEV-1601-003

The concrete slab design selected as the element for review in this case resulted in six separate issues associated with the DR.

- a) The VSR effort found that the loads resulting from the seismic effects on the component cooling water heat exchanger had not been considered in the design of the floor slab. The slab calculations are to be redone, however, based on similar calculations completed for Sequoyah, the licensee has judged that, in all likelihood, there is adequate slab capacity and that the discrepancy was not design or safety significant. The inspector, after reviewing the existing calculations and the design loads, concurred in this judgment. The licensee's corrective action, which S&L has concurred with, will require TVA to review all slab calculations where heat exchangers are located.

The inspector determined that the scope of the corrective action is insufficient to correct the probable cause for the finding in that it appears that the effects of seismically induced overturning moments of equipment on the slabs were not adequately considered. Consequently, TVA was requested to expand the review to evaluate the effect of all equipment, with a weight of 2 kips or more, positioned on concrete slabs. This would encompass such things as tanks, large pumps, and motors. This additional evaluation should also be completed prior to fuel loading. This is identified as unresolved item 50-390/89-02-03, "Calculation of All Loads On Concrete Slabs," pending the licensee's resolution of this issue.

- b) The VSR effort determined that the uniform design live load specified on the drawings was 100 psf larger than the uniform live load used in the original design of the slab system in the region supporting the component cooling water heat exchanger. A review of the calculations by the licensee determined that the correct loads were used in the design process and that the 450 psf value shown on the drawing was an error. S&L reviewed the licensee's response and accepted that response and the fact that it was determined to be discrepant with no design or safety significance. The drawing is to be revised.

The inspector accepted this response and the corrective action as being responsive to the VSR identified discrepancy.

- c) The VSR effort identified the fact that the slab under consideration is loaded by various pieces of equipment, mechanical piping, HVAC and cable trays and that these loads have not been determined to be within the design load limits for the slab. The general concern over the cumulative effect of attached loads had been previously identified by TVA within the Employee Concern Program. TVA is addressing this type issue through the live load verification program which will complete the live load reconciliation required under the provisions of the design criteria, WB-DC-20-1. This situation has been assessed for significance and found, based on a similar load verification on Sequoyah, to not be design or safety significant. The specific review and evaluation will be completed under the live load verification program prior to fuel loading. S&L accepted this assessment and corrective action as described in the CR.

The inspector's review and evaluation of this issue revealed no additional concerns and the outlined corrective action is acceptable.

- d) The VSR inspection effort identified the fact that a later revision of the ACI 318 Code than specified in the FSAR had been used for the design of the slab system in the area under review and that no calculations had been performed for loading cases which included seismic loads. This situation apparently arose from the fact that the code was based on a working stress design approach whereas the 1971 Code utilized the USD. The licensee determined that all reinforced concrete slabs designed by USD in the auxiliary building suffered from the same problem in that all loading combinations had not been adequately addressed. The licensee's corrective action has been defined to be a review of all slabs where USD was used to determine if the load combination assumed as controlling was in fact the maximum loading. In this instance, TVA reviewed the calculation and determined that the controlling loading combination for the slab was the service load combination which had been used in the USD method. The actions needed to review all the slabs in the auxiliary building designed by USD will be completed before fuel loading. S&L accepted TVA's resolution report and agreed that the issue was not design or safety significant.

The inspector has also evaluated the action and accepted the VSR documents with the exception being that the TVA review must extend beyond the slabs in the auxiliary building which were designed by USD. It is the NRC's position that all slabs in Category I structures which were designed or redesigned by USD shall have the calculations reviewed for adequacy of the load combinations actually considered in the supporting calculations. This is a second part of unresolved item 50-390/89-02-03.

- e) The VSR effort identified the fact that the application of attached loads which were treated as live loads was not adequately considered in the generic calculations to justify the critical load case. TVA indicated the designers had relied upon their knowledge of the acceleration values and that they were small enough so as to not impact allowable stresses which could be permitted to increase under seismic conditions. A supplemental calculation was performed by TVA to substantiate that the DL + LL combination does in fact control the design. This basis also substantiates the same situation on other auxiliary building slabs which originally were also assumed to be controlled by only DL + LL. S&L reviewed the corrective action defined by the licensee and concluded that this issue was a valid discrepancy, but was not design or safety significant. The corrective action was deemed to be appropriate.

The inspector concluded that this issue had been properly resolved within the VSR scope and that the corrective action was appropriate.

- f) During the VSR effort, it was found that no specific consideration was given to in-plane shear loads within the slab at the wall-slab interface at areas adjacent to slab openings. TVA acknowledged this failure in the specific calculation and, after a review of other slab calculations, determined the same oversight exists. Consequently, the defined corrective action includes checking for the in-plane shear at the wall-slab interface in areas adjacent to slab openings on all slabs. This will be conducted in combination with the live load verification program which will involve a review of all slab calculations. The specific case for this particular slab based on similar calculations at Sequoyah indicated this slab at elevation 737'-0" was fully adequate to transfer the resulting forces. A supplemental calculation has been issued to demonstrate this fact. S&L accepted the TVA resolution report and issued a completion report concluding that this issue was a valid discrepancy but showed no design or safety significance.

The inspector reviewed these actions, evaluations and proposed corrective action and agreed that this matter had been adequately addressed.

In summary, the specific discrepancies identified from the review of the slab at 737'-0" were evaluated by TVA and as a result, several of the

issues were included in a CAQR (WBP 880786) as noted in the RR, revision 1, dated January 7, 1989, Items (1), (2) and (4).

A review of CAQR WBP 880786, dated December 14, 1988, revealed that DR 104, with its associated subparts, was not included in the CAQR. This constitutes a failure on the part of TVA to document a condition adverse to quality as provided for in the TVA QA Topical Report and the Nuclear Quality Assurance Manual, Part I, Section 2.16. This is a fifth example of violation 50-390/89-02-01. Additionally, the inspector identified two areas where the corrective action activity defined by TVA needs to be expanded as discussed previously. These are identified as unresolved item 50-390/89-02-03.

Discrepancy Report 25, Checklist SEV-0901-002

The element selected in this case was a typical safety-related pipe support identified as defined on drawing 47A05-7. The defined discrepancy was that no calculations were available as analytical backup to the design drawings.

As reported in IR 50-390/88-09, TVA had completed a RR which S&L had reviewed but had been unable to conclude the TVA actions were acceptable.

TVA has now completed a revision to the earlier RR which has been reviewed by S&L. Calculations have been made and updated to demonstrate the capability of the support to meet the design requirements and these have been reviewed by S&L. That resulted in some further checking to substantiate that none of the supports were used in elevations outside the range of qualification for seismic loading. S&L has accepted this issue as a previously identified discrepancy encompassed by SCR WBNCEB 8531 with no design or safety significance. S&L has also relied on the fact that TVA has committed to two corrective action programs (CAPs) which will impact this specific concern area. These are the Hanger and Analysis Update Program (HAAUP) and the Design Baseline and Verification Program (DBVP). The two CAPs will address the generic, broad issues which arise from the specific discrepancies that were identified. The specific design criteria, WB-DC-40-31.9, will be reviewed as well as its application and the existence and completion of essential pipe support calculations will be determined and any necessary corrections completed. This work will be accomplished prior to fuel load.

A review of the documentation and discussions with the cognizant personnel by the inspector revealed no inconsistencies or new areas of needed emphasis or review by either TVA or S&L. This discrepancy is being adequately addressed.

Discrepancy Report 115, Checklist SEV-1301-002

The VSR effort identified several issues associated with the review and evaluation of this element which were then massed together into DR 115.

The specific pipe support reviewed in this instance, 47A055-145, was found to have design calculations for the deflection check which characterized the main member as tubular steel with a thickness of 3/8 inch whereas the bill of materials on the construction drawing was 1/4 inch which is on the unconservative side. Additionally, it was found that the weight of the actual members had not been considered in the calculations/considerations of deflections or frequencies. This was in conflict with the governing criteria which had been defined in a TVA document WB-DC-40-31.9. TVA, in response, acknowledged these as discrepancies in the design methodology and indicated that the issues were encompassed by the scope of their efforts in the HAAUP CAP. TVA, in the RR, also indicated the specific issue had not been previously identified. The S&L review of the updated RR accepted the TVA corrective action with the understanding that the HAAUP CAP would capture and resolve these issues and any generic considerations arising from them.

A review of the issues, their resolution and final completion report by S&L was conducted by the inspector. While the resolutions, as defined, appear to be acceptable, they are heavily contingent on the thoroughness of the HAAUP CAP during execution. However, based on the information currently available, the inspector concluded the actions on this issue were acceptable.

Discrepancy Report 38, Checklist SEV-1702-003

The VSR identified a series of issues during the review of this specific element. The specific element was the equipment support/foundation for a component cooling water surge tank.

- a) It was found that the fluid sloshing loads had not been considered as required by the design criteria and consequently the determination of the controlling load case was a flawed process. TVA performed a calculation which substantiated the designer's selection of the critical case used in the the design thus verifying the original design bases and selection of the controlling load case. This issue was determined to be non-discrepant.
- b) S&L, in the review, also found that, for this particular element, the drawings had been released prior to the date on which the design calculation were approved. The action was not in agreement with the governing TVA engineering procedures. TVA completed calculations which verified the design and S&L reviewed and accepted these as supporting the existing design. This issue was found to be non-discrepant.
- c) S&L, in conducting the VSR, identified a configuration of shear studs for a concrete embedment for which several design parameters appeared to not have load limits set for them. TVA performed calculations to evaluate the specific conditions. As a result of these recent calculations, this item was found to be non-discrepant.

- d) During the VSR, it was found that the frequency calculation for the tank was performed without consideration of the effects of shear deformation and the effect of the model configuration with respect to mass distribution. Both of these issues raised a question regarding the computed frequency of the tank. TVA acknowledged this issue as a valid discrepancy which required evaluation. Once the evaluation was completed by TVA, S&L performed a final review of this work. This issue is considered to have been a valid discrepancy identified by the VSR but not design or safety significant. The review by TVA after this issue was identified resulted in finding other tank calculations which suffered from the same deficiency. TVA will review all tanks to determine whether or not there is any impact on the design or plant safety.
- e) During the VSR effort on the review of this element, it was found that the prying action of the tank base had not been considered for its effect on the anchor bolts. A review of this issue resulted in TVA and S&L being in agreement that the item was non-discrepant, however, the bolt load calculation was reviewed and some minor changes were made.

The inspector's review of the issues encompassed by this DR revealed that there were issues which were VSR identified, but none were design or safety significant. Corrective actions for both the specific element and the generic situation are acceptable based on the inspection evaluation. It is noted that for these four issues TVA is considering that CAQR WBP 880786 will provide adequate corrective action. The inspector accepted this position.

Discrepancy Report 51, Checklist SEV-1901-002

This checklist, SEV-1901, was developed to address the design of masonry walls within the plant and was utilized on three specific walls or elements by S&L within the VSR effort. The specific element reviewed for SEV-1901-002 consisted of a reinforced masonry wall in the auxiliary building in Section A2-A2, between column lines C10 and C11.

The checklist was reviewed by the inspector and determined to be fully adequate for use in the determination of facts related to an evaluation of the design adequacy. Based on the documents maintained by S&L for this specific element, it was determined that S&L had adequately implemented the steps contained in the list.

As a result of the VSR review a discrepancy report was generated. This discrepancy report, DR 051, identified several issues related to the design of masonry walls.

- a) The relevant project design criteria, WB-DC-20-2, designated a lateral design load of 20 psf which was to account for miscellaneous attachment loads. The VSR identified the fact that the summation of lateral loads on the walls had not been obtained. Several comparisons of the actual resulting loads from the as-built condition to the

as-designed condition were made. TVA has performed additional calculations which substantiate the fact that all the current attachments to the masonry walls are still within the design envelope for lateral loads of 20 psf. Additionally, TVA acknowledged that this was a valid discrepancy but was not design or safety significant and the generic problem had been identified. TVA will be addressing any generic aspects of this discrepancy via the identification and collection of essential calculations in the DBVP CAP effort. S&L reviewed and assessed the RR provided by TVA and documented this in the CR.

Based on the inspector's review of this issue and the new TVA calculations, this position was found to be acceptable. TVA has committed to the completion of the work before fuel load.

- b) The masonry wall actual boundary conditions were found during the VSR to be different from those assumed or used in the design of the walls as well as the structure as a whole. This issue is basically one of undocumented basis for engineering judgment. TVA has now performed calculations to substantiate the previous judgments. Consequently, the RR was reviewed and accepted by S&L with the issue characterized as a nondiscrepant item which had been previously identified.

The inspector's review of the new calculations and the facts used by TVA and S&L to resolve this issue indicated that this issue was adequately addressed.

- c) Based on the issue in (b), the VSR effort could locate no calculations to demonstrate that the effect of the supported wall, which was anchored to the floor slab, had been considered in the design of the slab.

TVA, in order to address this issue, completed additional calculations to determine the magnitude of the wall effects on the slab. As indicated in the RR, TVA found that the magnitude of the moments from the wall was insignificant with the other combined load effects. This substantiated that the design requirements were met. S&L and TVA agreed that this issue was a non-discrepant observation which had no specific design adequacy impact. S&L documented this issue's closure in a CR.

The review by the inspector of this issue revealed that this matter was adequately addressed and did not represent a discrepancy. The completion report is adequate.

- d) During the VSR review of this element, it was found that the wall had an electrical box mounted on it for which no supporting calculations for its anchorage could be located. Thus, the adequacy of the attachment could not be substantiated.

TVA performed a calculation since it had been determined that, originally, the mounting of the small boxes had been based on

engineering judgment with regard to the size and number of anchors. This calculation demonstrated the adequacy of the anchorage detail provided on the design drawings. In conjunction with this effort, the CV effort determined that one box was not mounted with anchors as designed but with toggle bolts. As a result of this finding, a PRD was written (WBP 880770P) to initiate corrective action.

S&L has prepared a CR and accepted the actions which are within the scope of the VSR. TVA now has to resolve the field problem identified during the VSR.

The inspector's review of this issue revealed that the issue has been adequately addressed and was properly classified as a valid discrepancy which had no design or safety significance. TVA, however, must resolve the field installation problem found during the VSR and correct any physical conditions as dictated by the PRD. In addition, TVA must address any generic problem such as the frequency of installed anchors not corresponding to the design drawings and the associated safety implication. Further, the inspector questioned the issuance of a PRD in lieu of a CAQR. This issue is discussed earlier as unresolved item 89-02-02.

Discrepancy Report 652, Checklist MEV-1518-013

This checklist, MEV-1518, was developed to provide for a review of the design control process used by TVA during the timeframe when the original design work was executed. A series of elements was selected by S&L in order to sample the design process as carried out by the different disciplines involved in the design effort. The checklist provides for evaluation of the process used to determine design input, the design organization and interfaces, the design process, the design verification, the design output, and the design change control process. The review by S&L relied on records as well as interviews with TVA personnel who were involved in the design process at the time.

The VSR effort identified issues which were incorporated into DR 652 which defined that TVA procedures at the early timeframe did not contain requirements to assure that calculations were prepared, reviewed, and approved prior to the issuance of the related design documents. The checklist was determined by the inspector to be adequate and the form was being properly used. The response by TVA in a RR was under review by S&L at the time of the inspection and the DR remains open.

Discrepancy Report 315, Checklist SEV-0202-038

This DR identified seven discrepancies regarding missing calculations and incorrect calculations. The RR states these discrepancies were previously identified by the licensee and documented in the Electrical Conduit and Conduit Support CAP, Revision 1.

The Completion Report states: TVA has stated that the root causes for the identified discrepancies are:

- 1) Engineering did not completely implement the design criteria and did not perform an adequate design review in some cases.
- 2) The design criteria were incomplete in that several critical attributes were not addressed or correctly accounted for, which was due in part to inadequate control and documentation for engineering judgment.

TVA has also stated that the potential generic implementation is that these problems could exist for other typical conduit support designs for WBN. TVA committed, in the RR, to review all existing electrical conduit and conduit support designs for correctness and completeness and revise them as necessary. In addition, TVA has committed that the existing conduit and conduit support design criteria will be reviewed for technical adequacy and agreement with the FSAR and other licensing commitments. S&L agrees with these assessments. The CR states that the significance of this discrepancy has not yet been determined.

The inspector's review concluded the resolution and planned corrective actions for this discrepancy are acceptable pending adequate implementation of the CAP.

In summary, the VSR in the structural area appears to have been a well defined, logical process which was adequate to obtain a cross-section view of the project in order to assess the adequacy of the project. The resolution process between TVA and S&L appears to have been performed adequately, with S&L properly pursuing issues which, in their professional judgment, required resolution.

Two areas of concern were identified by the inspector which were not highlighted by TVA or S&L for future action. For DR 104, the inspector's judgment is that TVA should address the effects of all equipment, tanks, etc., over 2 kips in weight on the supporting slabs for seismic loads. Additionally on DR 104, the inspector found no evidence to support limiting the review of slabs for the proper load case based on different code revisions to just the auxiliary building. Slabs in other Category I structures should also be reviewed. These items are identified as Unresolved Item 50-390/89-02-03.

11. Miscellaneous Review of Discrepancy Reports

Discrepancy Reports 45, 132, 201, 215, and 272 - Checklist MEV-1511, EEV-0405, MEV-1506, and MEV-1517

The inspector's review of the above DRs consisted only of a cursory review of the TVA RR report and then only in the area of missing calculations. S&L had identified the fact that due to missing calculations, a review of system adequacy could not be completed. The calculation problem as stated

in the DR was, "Most of the essential mechanical calculations do not exist to verify the adequacy of the system design".

The inspector expressed concern regarding who will review the adequacy of design after the calculations are regenerated as part of the DBVP calculation effort. The licensee acknowledged NRC's concern.

12. Licensee's Action On Previously Identified Items

(Closed) URI 390/88-09-01, "Installed Hardware Compliance With Latest Design Documents".

Inspection report 88-09 identified the following concern relative to the VSR review.

- The engineering review is performed based on the latest design documents available as of April 22, 1988. The inspector was concerned about how S&L applied this review to the as-installed condition. The inspector reviewed the checklist ECV-0101-001 for cables and was informed by S&L that for CV, S&L verified that construction was conducted in accordance with design documents used at the time of construction. However, the inspector was unable to confirm that a review is done either by EV or CV to verify that the design documents in effect at the time of construction resulted in acceptable hardware installation.

S&L provided the following information which resolves the concern.

- Component Review

The components and system design requirements from the CCS, the auxiliary electric power system and the horizontal areas were identified by the VSR.

The latest applicable technical design standards and guides were verified to assure compliance with the acceptance criteria (licensing requirements and design basis documentation requirements).

The latest applicable technical design attributes (as defined on the latest design output documents) were reviewed for compliance with the acceptance criteria and the latest technical design standards and guides.

If a component/system design was designed or constructed to an earlier technical standard or design guide, then the component/system was still reviewed for compliance with the current VSR acceptance criteria. There were numerous components where TVA may have been

using an older version of a design criteria or technical standard, however, the technical adequacy of these components was still assessed against the current acceptance criteria. The following items are examples of this type of review:

- If a component reviewed was "grandfathered" to a less stringent criteria than those contained in the current technical standards or guides, then a specific review was performed to assure that the less stringent rules are in compliance with the latest licensing commitments.

The following item is an example of this type of review:

Expansion anchor support design criteria were changed in 1982. The older criteria were judged to be acceptable based on licensing commitments, and designs done prior to 1982 were verified against the older criteria.

- Goal of engineering verification

The intent of the EV is to show that the latest approved design documents are technically adequate and comply with the licensing commitments and other design basis documents.

- Design process review

The design process review was performed independently to assure that there were published procedures, policies, and practices during the time of the original design process which were in compliance with the licensing commitments at the time.

DRs were prepared if a required procedure either did not exist or was inadequate.

- Engineering verification vs construction verification interface

The as-constructed condition for the representative sample of components are reviewed against the latest design output drawings and specifications.

If a difference between the design output document and the as-constructed component is identified, a DR is prepared.

At times during the resolution process, TVA has identified inactive notes as the applicable acceptance criteria for the subject work. Inactive notes are notes that no longer apply to new construction activities but are still in effect for work performed prior to the note being placed in the inactive category. When TVA identifies an inactive note as a resolution to a DR and the inactive note was made inactive after the completion of the construction activity, the CV DR would be

dispositioned as non-discrepant providing proper engineering evaluation is made to justify the variance from the current design output document. If the current note is less conservative than the inactive note, no further evaluation is required. However, if the current note is more conservative than the inactive note, the effect of applying the inactive note must be evaluated to justify the variance from the current design output documents.

- Review of inaccessible/non-recreatable elements/attributes

The following is a table showing the complete list of excluded elements/attributes and how they were treated during records verification.

CV EXCLUDED ELEMENT/ATTRIBUTE	INCLUDED IN RV CHECKLIST	REVIEWED BY S&L
Cable/Splices	Yes	None
Cable/Damage	Yes	None
Cable/Routing	Yes	Yes
All Electrical Equip/Hole Size	Yes	Yes
All Electrical Equip/Fraying Surface	Yes	Yes
All Electrical Equip/Bolt Torque	Yes	Yes
All Electrical Equip/ Hazards	Yes	Yes
Penetration/Damage	Yes	Yes
Duct Inline Components/ Internals	Yes	Yes
Duct Inline Components/ Seal	Yes	Yes
Check Valves/Disc Only	Yes	Yes
Fire Stop and Seals	Yes	Yes
Fire Stop/Thickness	Yes	Yes
Fire Stop/Material	Yes	Yes
Fire Stop/Cell Structure	Yes	Yes
Pump/Alignment	Yes	Yes
Pump/Balance	Yes	Yes
Grout/Fill	Yes	Yes
Grout/Contact	Yes	Yes
Reinforcing Steel	Yes	Yes
Foundation Work	Yes	Yes
Embedment Plates	Yes	Yes
Penetration Anchors	Yes	Yes

The inspector's review indicated that the VSR method of verifying that the EV and CV met the applicable design criteria was acceptable. This item is closed.

13. Exit Interview

The inspection scope and findings were summarized on February 17, 1989, with those persons indicated in paragraph one. The violation and the two unresolved items were discussed with the licensee in meetings on site on February 21, 1989 and March 28, 1989. 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
390/89-02-01	Open	VIO - Failure to Disposition Nonconformances As Required By TVA's Nuclear Quality Assurance Manual. Paragraphs 7, 8, and 10.
390/89-02-02	Open	URI - Documenting Nonconformances On PRDs Instead of CAQRs. Paragraph 9.
390/88-09-01	Closed	URI - Installed Hardware Compliance With Latest Design Documents. Paragraph 12.
390/89-02-03	Open	URI - Calculating All Loads On Concrete Slabs. Paragraph 10.

15. List of Acronyms and Initialisms

ACI	American Concrete Institute
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAQR	Condition Adverse to Quality Report
CATD	Corrective Action Tracking Document
CCS	Component Cooling System
CR	Completion Report
CRDR	Control Room Design Design
DBVP	Design Baseline Verification Program
D.C.	Direct Current
DC	Design Control
DCN	Design Change Notice
DL + LL	Design Load plus Live Load
DNE	Division of Nuclear Engineering
DNC	Division of Nuclear Construction
DR	Discrepancy Report
EA	Engineering Assurance

ECV	Electrical Construction Verification
EEV	Electrical Engineering Verification
ERV	Electrical Record Verification
FAA	Future Action Acceptable
FSAR	Final Safety Analysis Report
HAAUP	Hanger And Analysis Update Program
IEEE	Institute of Electrical and Electronic Engineers
IR	Inspection Report
IRC	Internal Review Committee
kips	Unit of weight equal to 1000 pounds
MCV	Mechanical Construction Verification
MEV	Mechanical Engineering Verification
MOV	Motor Operated Valve
MR	Maintenance Request
MRV	Mechanical Record Verification
NE	Nuclear Engineering
NQAM	Nuclear Quality Assurance Manual
NRC	Nuclear Regulatory Commission
NYD	Significance Not Yet Determined
OR	Observation Report
PDS	Design Significant
PSF	Pounds Square Foot
PNDSS	Not Design or Safety Significant
PRD	Problem Report Document
PSS	Safety Significant
QA	Quality Assurance
QCP	Quality Control Procedure
RR	Resolution Report
SCV	Structural Construction Verification
SER	Safety Evaluation Report
SEV	Structural Engineering Verification
SRV	Structural Record Verification
S&L	Sargent and Lundy
TACF	Temporary Alteration Condition Form
TVA	Tennessee Valley Authority
USD	Ultimate Strength Determination
UPS	Uninterrupted Power Supply
VAC	Volts Alternating Current
VNDSS	Not Design or Safety Significant
VSR	Vertical Slice Review
WB	Watts Bar
WBEP	Watts Bar Engineering Procedure
WBN	Watts Bar Nuclear

Attachment 1

Discrepancy Reports Reviewed During This Inspection

Discrepancy Evaluation

<u>No.</u>	<u>DR</u>	<u>Checklist</u>	<u>Non Discrepant</u>	<u>Not Design Or Safety Significant</u>	<u>Design Significant</u>	<u>Significance Not Determined</u>
1	07	EEV-0101				X
2	14	MEV-0704			X	
3	15	MEV-1401		X		
4	24	SRV-0302		X		
5	25	SEV-0901		X		
6	29	ERV-0408		X		
7	38	SEV-1702		X		
8	42	MEV-0411			X	
9	45	MEV-1511				X
10	51	SEV-1901		X		
11	70	MEV-1403		X		
12	81	EEV-0410				X
13	95	MCV-0704				X
14	98	MCV-0704	X			
	104	SEV-1601		X		
	115	SEV-1301				X
17	132	EEV-0405				X
18	134	EEV-0409		X		
19	183	EEV-2109			X	
20	201	MEV-1506				X
21	215	MEV-1517				X
22	242	EEV-0403		X		
23	272	MEV-1517				X
24	298	EEV-2102			X	
25	315	SEV-0202				X
26	397	EEV-1515		X		
27	410	SRV-1702	X			
28	423	MRV-1510	X			
29	430	MCV-0704				X
30	437	SCV-0301				X
31	442	MRV-1403		X		
32	489	SCV-0901				X
33	587	MCV-1515				X
34	599	ECV-0101			X	
35	603	ECV-0101			X	
36	652	MEV-1518				

OPEN - UNDER S&L REVIEW