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

Report Nos.: 50-390/91-03 and 50-391/91-03

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

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

Facility Name: Watts Bar 1 and 2

Inspection Conducted: February 16, 1991 - March 15, 1991

Inspector: G. A. Walton 04/12/91
G. A. Walton, Senior Resident Inspector Date Signed
Construction

Consultant: R. M. Compton, Nuclear Power Consultants, Inc.
(Paragraphs 6, 7, 8, 9, and 10)

Approved by: K. P. Barr 4/12/91
K. P. Barr, Section Chief Date Signed
TVA Projects

SUMMARY

Scope:

This routine resident inspection consisted of a review of; the status of technical issues, General Construction Specification, recent trends, concrete block walls, storage of Class 1E Cable, placement of conditions adverse to quality documents in Unit 2 hold status, drawing and document control, sealing of spare conduit sleeves, crimping of Class 1E cable terminations and splices, seismic and civil status, and previous inspection findings, as well as touring the facility.

Results:

Two violations were identified in this inspection period. The first violation involved ineffective corrective action with three examples identified in paragraphs 6, 7, and 10. The second violation, with two examples identified in paragraphs 6 and 8, involved inadequate procedures. The first violation identified examples of the lack of prompt identification and resolution of conditions adverse to quality similar to the NRC's concerns expressed in Inspection Reports 50-390, 391/90-27, and 90-31 regarding your corrective action program. The second violation indicates a continuing problem with compliance of procedures and design requirements.

Three unresolved items were opened during the inspection (paragraph 2 and 3) and will require further NRC inspections.

Negative trends were noted in the areas of drawing controls, system cleanliness and performance of equipment when initially tested as part of the Prestart Testing Program (paragraph 4).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*S. Blount, Materials Manager
L. Bush, Operations Superintendent
*S. Crowe, Site Quality Manager
*W. Elliott, Engineering Manager, Nuclear Engineering
E. Fuller, Chairman, Program Team
*J. Garrity, Site Vice President, Watts Bar
*A. Gentry, Employee Concern Specialist
*R. George, Engineering and Modifications Manager
L. Jackson, Operations Manager
R. Johnson, NE Special Projects Manager
M. Jones, Startup and Test Manager
F. Laurent, NQA Special Projects Manager
*W. Lenahan, Materials and Procurement Manager
*R. McCollom, Maintenance Program Manager
*C. McIntosh, Electrical Field Engineering Manager
*L. Nolan, Construction Manager
C. Nelson, Maintenance Support Superintendent
P. Pace, Compliance Licensing Supervisor
*G. Pannell, Site Licensing Manager
*R. Purcell, Plant Program Manager
*J. Scalice, Plant Manager
*E. Wallace, Manager of Nuclear Licensing
*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.

2. Review of Technical Issues

During this inspection period the inspectors performed follow-up reviews of several design issues associated with the AFW system that was recently reviewed by the NRC's IDI team. The first issue was whether the AFW system was designed to provide water to the SGs with the auto level control feature and meet the Westinghouse RCS temperature requirements specified in the PLS document. The second issue involved the purpose and location of the pressure regulator valve with respect to the pump and the AFW branch supply lines for each SG.

a. The first issue was identified at Sequoyah during the unit 2 restart in 1988. Westinghouse PLS states in precaution 7.a, "Reactor coolant temperature must be monitored and feedwater flow adjusted to prevent a loss in shutdown margin as a result of cooling the reactor coolant below its no-load temperature. A trip after a long period of reactor shutdown leaves little decay heat to be removed, thus causing the possibility of excessive cooling of the reactor coolant if too much feedwater is being added. Never restore the water level, after plant trip, at the cost of a reduction of the shutdown margin (reactor coolant temperature)." Due in part to the auto level control feature of the AFW system combined with steam dump control set points, the RCS temperature at Sequoyah was cooled substantially below the established no-load value after each reactor trip from power.

During discussions with the licensee's engineering department the following information was presented:

(1) The WBN AFW system was designed to supply adequate flow to the SGs for various design basis events. The pumps will provide full flow upon receipt of safeguard actuation signals. The amount of flow needed is controlled automatically by the SG level control valves. This is the design objective of the AFW system.

(2) The Westinghouse document titled, "PRECAUTIONS, LIMITATIONS AND SETPOINTS FOR NUCLEAR STEAM SUPPLY SYSTEMS," Page 7, contains setpoints to prevent RCS over cooling. TVA Report No. CEB-76-1 which establishes the methods to be utilized in the performance of TVA Class A Transient Analysis for WBN identifies the inadvertent RCS cooldown and depressurization as one of the transients that should be analyzed.

(3) The SQN Plant had experienced several cooling events following reactor trips where the cause was attributed to excess AFW flow. Originally, it depended on the operator's actions consisting primarily of following Emergency Procedures (EOPs, ES-0.1 "Reactor Trip Response.") Subsequently, Westinghouse was contracted to modify the steam dump control temperature setpoint in a change to the PLS document.

(4) The SQN cooling events with the automatic control of AFW flow and the inadvertent RCS depressurization had not been identified as a deficiency at WBN due to the differences in SG design and injection means. WBN has D3 SG while SQN has Model 51. At WBN, AFW enters the SG through the 6 inch upper nozzle while at SQN it enters the SG through the 16 inch main feedline.

(5) WBN has a proposal from Westinghouse to evaluate the over cooling issue that is being reviewed by TVA.

The licensee also indicated that the current transient analysis assumed the AFW inlet water temperature to be 120 degrees F (i.e., worst case for heat removal). However, the AFW system inlet water temperature could be as low as 40 degrees F which would be a worst case for a RCS cooldown by the AFW system. This condition has not been analyzed. The licensee indicated that the Westinghouse proposed analysis discussed above would address this unanalyzed condition as well as evaluating the acceptability of operator intervention through the use of EOPs to combat this type of transient. At the initial meeting the licensee was unable to demonstrate that start-up testing would verify the operation of the AFW system post reactor trip, with an acceptance criteria that would ensure that the PLS values were not violated. The licensee also indicated that the PLS requirement should have been a design objective of the AFW system and that the design criteria should reflect this.

On March 12, 1991, the licensee indicated that a CAQ (PER WBPER 910117) was being processed to identify the unanalyzed condition. Additionally, the licensee indicated that the PER would be the vehicle to ensure that the unanalyzed items discussed above were evaluated and corrected. The licensee also indicated that verification of this feature will be tested during the startup test program and is addressed in start-up test procedure SU-1.1.

It appears that the generic applicability review of this issue for WBN based on the 1988 Sequoyah event documented on CAQR SQP880375, was improper. The generic review indicated that the SQN CAQ related to performance of operating activities at an operating plant and, as stated in the guidelines for review of a CAQR (section 2.16 of part 1 to NQAM), it was determined that it was automatically not applicable to units still under a construction permit. This corporate approach does not appear to be consistent with the intent of NRC Order 85-49 which modified the operating licenses of the Sequoyah and Browns Ferry Nuclear Plants and dealt with TVA's process for resolving conditions adverse to quality. However, a review of the licensee's current QA Plan (TVA-NQA-PLN89-A revision 1) revealed that the area of generic review of CAQ was not covered in the QA plan. Generic review is required by TVA corporate standard manual, but there appears to be no source note to tie this to the NRC order. The requirement to source note commitments will be reviewed at a later date as a follow-up to URIs 50-390/86-21-06 and 50-390/90-06-03.

Resolution of the unanalyzed condition as documented on PER WBPER910117, along with changes to the AFW DBD is identified as URI 50-390, 391/91-03-01, RCS Cooldown Due to AFW Design. The acceptability of the generic reviews of operating plant CAQ, for applicability to Watts Bar is identified as a separate URI 50-390, 391/91-03-02, Applicability of Generic Reviews for WBN.

b. The second issue involved the purpose and placement of the pressure regulator valve on each of the two MDAFW pumps. The licensee indicated that the purpose of the pressure control valves PCV-3-122 and PCV-3-132 is to prevent motor-driven pumps from operating in a runout condition during a line break event. The licensee further stated the reasons for locating them in the pump discharge instead of individual branch lines are as follows:

(1) There is less hardware to procure and maintain, thus fewer failures.

(2) There is less complexity in the control system.

(3) With a feedwater break on one SG the AFW system is still able to meet the flow requirements of a design basis event. The AFW system is designed to supply flow to the steam generators under various accident conditions. Assuming the above feedwater line break the PCV would close and the two SGs supplied by that MDAFW pump would not receive AFW from the motor drive pumps. However, even with a single failure loss of the other train power the TDAFW pump would feed two SGs and thereby satisfy the accident analysis.

The EQ issues with the TDAFW pump steam supply valves is discussed and will be resolved through resolution of deficiency D.7 in the NRC's IDI Report 50-390/91-201.

3. General Construction Specification Review

a. On March 8, 1991, the inspector met with TVA Engineering and Construction personnel for the purpose of reviewing the controls that ensure that the requirements of the G-Spec are captured in the applicable construction or procurement procedures. The licensee described the SIP process for G-32. This review resulted in Revision 14 to G-32. Additionally, the licensee described the G-Spec to construction procedure roll down process for two technical areas controlled by G-32, job proportioned grout and Hilti expansion anchors.

The licensee provided the following information to demonstrate that controls to ensure that changes to upper tier G-Specs are known and evaluated by organizations who have used these specs as a basis for their implementing procedure.

The requirements for maintaining a cross reference matrix is contained in AI-1.60, "Implementing Nuclear Procedures System Documents and Maintaining a Cross Reference Matrix." By following this procedure, the site procedure staff identifies revisions to the upper tier documents, including General

Construction Specifications, to the affected site organizations. The site organizations are then required to respond to the open item issued by the site procedures section by either providing a revision to the impacted procedure or indicating that no upper tier requirements implemented by their procedure have changed.

The inspector verified the above process by a review of the referenced information. Additionally, the inspector's initial concern associated with the roll down of G-Spec requirements was also discussed with the licensee. Specifically, the licensee's DBVP licensing verification effort only ensured that the licensing commitment was captured in an upper tier procedure, in this case the G-Spec. The licensee is currently in the process of assessing the construction work control process which includes a review and streamlining of the CPI. This process has the potential for omitting requirements.

The licensee indicated that they do not have a matrix roll down that ties the licensing requirement to the implementing procedure. However, they contend that the process and examples discussed above demonstrate that the G-Spec requirements are effectively captured in the implementing procedures.

Through discussion with the licensee, the inspector determined that, for the examples discussed, the licensee appeared to capture the upper tier requirements. However, the process as described was cumbersome and involved significant cross referencing between procedures. This "daisy chain" of procedures has been identified as a potential contributor to other work control problems at Watts Bar.

b. The inspector also reviewed recent revisions to G-38 to determine if they had been incorporated in the site implementing procedures. Two recent changes were chosen for the review as discussed below.

G-38, Revision 10, SRN-G-38-111 released December 5, 1990, paragraph 3.7.1.1 B specifies acceptance criteria for cable inspection.

The affected procedure WBN CPI-8.1.8.E 105, Revision 1, and IC 90-682 issued December 5, 1990, incorporated, SRN-G-38-101, 103, 107, 108, and 110.

As stated in SRN-38-111 dated December 5, 1990, the implementation date of the SRN is 90 days of issue or sooner. The 90 days expired on March 5, 1991, and SRN-38-111 was not incorporated in the affected procedure WBN CPI 8.1.8.E 105 as required by that date.

Construction Specification G-38, Revision 10, issued on November 30, 1990, included several changes. As examples, paragraph 1.2.1 incorporated standard design drawings SD-E12.5.1-1 and SD-E12.5.1-2 both titled Cable Splicing and Termination. Also paragraph 1.1.3 of

Revision 10 incorporated MIL-STD-454. The latest revision of WBN CPI-8.1.8.E 105 dated February 7, 1990, failed to incorporate these requirements. It appears that all Revision 10 changes to G-38 failed to be incorporated in the CPI's as of the date of this inspection.

Due to the recent stop work it was unclear as to whether the outdated CPIs were used to perform safety related activities. It appears that the CPIs were not updated within the time specified on the revision to the G-Spec. The licensee is currently reviewing recent work to determine if outdated procedures were used to perform safety related activities. This item is identified as URI 50-390, 391/91-03-03, Update of CPIs Due to G-Spec Revision, pending NRC's review of the licensee's investigation.

4. Review of Recent Trends

During this inspection period the inspectors reviewed selected CAQRs, prestart test deficiencies, PRDs, and the TROI printout to determine if negative trends in any specific area had occurred. The January 1, 1990 through January 31, 1991, time frame was chosen for the review.

The review identified three areas that deserve noting. The first area involved drawing control. There were approximately 30 CAQ conditions documented as drawing related. Of these, 15 were considered by the inspector to represent drawing control problems. They ranged from the TVA drawing not matching vendor drawings, to recently developed CCD not matching actual as-built configurations. Most recently, PRD WBP910108P and PRD WBP910119P document conditions where the CCD, do not match the plant and where the CCD procedure (WBEP 5.17), did not require certain engineering requirements such as pipe code class breaks, pressure/temperature and limited QA boundaries as well as piping internal items such as restriction orifices, be verified during the CCD validation process. The latter requirement on validation, is extremely important since these parameters were identified at both Sequoyah and Browns Ferry as problems.

The second negative trend involved system cleanliness and foreign material being discovered in plant systems. This was the focus of TVA's incident investigation II-W-91-001. That investigation determined that recent CAQs; WBQ900167, WBP900383P, WBP910001, and WBP910019 indicated that there were system cleanliness problems at Watts Bar. Recent problems include weld rods in the valve body of the emergency electrical board room chiller A-A oil cooler temperature control valve; inspection mirror in the 1A-A RHR pump suction line; gravel, wire bristles, and plastic in the "C" CCS heat exchanger and the 2B-B CCS pump temporary discharge strainer. The licensee is currently evaluating the findings of the II in order to establish corrective actions.

The third apparent trend involves the performance of equipment and systems when tested. Specifically, the inspectors have monitored system and component testing as part of the prestart test program and SI reviews. During the system 32 (Instrument Air) prestart test, both of the air compressors failed to perform as expected and required rebuilding. The

flow balance of the CCS system had to be suspended for a period of time to flush the system of foreign material that was blocking flow passages. Recent SI testing has indicated premature failure of deep draft pumps to deliver their required flow rates. Approximately six of the eight ERCW pumps have required rebuilding and the High Pressure Fire Pumps are also experiencing failures.

The nature and cause of the equipment failure may be indicative of future problems and could be related to system layup/PM over the past six years since the last preoperational testing of the equipment. In order to ensure corrective action these concerns will be tracked by the NRC under IFI 50-390, 391/91-03-04, Observation of Negative Trends.

5. Review of Concrete Block (Masonry) Walls

During a tour of the Auxiliary Building the inspector noted a questionable condition associated with a concrete block wall. The wall was located on elevation 737 approximately eight to ten feet west of the A3 line and attached to a wall marked A3-U. The wall provided the barrier for the access door A125 to room 737.0-A6, which is the stair well for the unit 1 south MS valve room. The block wall appeared to be a load bearing wall, in that an approximately eight inch thick concrete slab which formed the roof of the stair well, appeared to be supported on one side by the block wall. Additionally, several large bore safety related piping supports identified as 47A427-4-5, 47A060-3-9, 47A060-3-11, and 1003-A060-3-8 are anchored to this slab.

Since block walls were the subject of NRC Bulletin 80-11 the inspector reviewed the licensee's response to this issue. In a September 14, 1981, letter from L. M. Mills to E. Adensam (RIMS A27 810914 026) TVA stated "the usage of unreinforced masonry walls in category 1 structures at Watts Bar is appropriate since they are designed as nonstructural members. They serve no load carrying function with regard to the building structure. That is, they do not function as vertical load bearing walls nor do they function as shear walls within the structure. The function of unreinforced masonry walls is to perform as radiation shield "plugs" for access openings to equipment or to function as partition walls ...." Based on the inspection the wall in question appears to be a load bearing wall supporting safety related equipment.

The licensee reviewed design drawing and calculations to determine whether the wall in question was reinforced or nonreinforced blocks and whether the wall was structurally acceptable and could support the attached loads.

On March 12, 1991 the licensee provided the inspector verification that the wall in question was in fact a reinforced block wall and therefore the Watts Bar specification allowed it to support a specified load. The licensee also provided Architectural Reinforced Masonry Walls Plans and Details drawing 46W405-4 which detailed the wall as a reinforced block wall. Additionally, the licensee provided inspection records for the wall in question.

All information reviewed by the inspector was found acceptable and the inspector had no additional questions in this area.

6. Storage of Class 1E Cable

As part of an evaluation of a concern identified to the NRC, the inspector reviewed TVA's implementation of corrective actions for CAQR WBP870420, Revision 12. This CAQR documented damage and improper storage conditions for Class 1E electrical cable. Current required corrective actions include: issuance of an Engineering Requirements Specification to detail the requirements for receipt, storage, and handling of cable; revision of procedures to implement these new requirements; establishment of storage facilities to meet the new requirements; and inspection and disposition of cable in storage in accordance with workplan FY000A-Z. The engineering requirements were issued on an interim basis as Drawing 47A100-2-0 (issued October 1987). Procedures AI-5.2, Attachment 1, "Requirements for Receiving, Marking, and Disposition of Electrical Cable," and AI-5.6, Attachment 1, "Specific Storage and Handling Instructions," implement these requirements.

The inspector reviewed drawing 47A100-2-0, the implementing procedures and workplan FY000A-Z, through Revision 4. The inspector performed an inspection of Hut 32 (the "Cable Barn") and adjacent Level D outside cable storage area for conformance to the engineering requirements. The inspector noted the following discrepant conditions:

(1) Numerous cable reels marked "Conforming Material, Class 1E" were stored outside without a roof as required by paragraph 3.4.1.7 of Drawing 47A100-2-0 and paragraph 1.4.A of AI-5.6, Attachment 1.

(2) Numerous cable reels, marked as "Conforming Material, Class 1E," located both inside and outside Hut 32, did not have the protective covering required by paragraph 3.4.1.4 of drawing 47A100-2-0 and paragraphs 1.4.A and 3.D of AI-5.6, Attachment 1.

(3) Cable reels were not clearly marked or segregated to distinguish which cable reels were acceptable for issue, which were under inspection or evaluation per workplan FY000A-Z, or which had outstanding unsatisfactory inspection reports or were nonconforming. Cable reels with both "Conforming Material, Class 1E," placards and QA "HOLD" tags were located in the same area (not otherwise marked, roped off or segregated) with other cable reels with the conforming material placards. Cable reels that were of indeterminate quality, because they were under evaluation per the workplan, were labeled with the "Conforming Material, Class 1E" placards.

The inspector reviewed QC inspection documents related to the condition of stored Class 1E cable (performed to support the workplan) and routine quarterly QC cable storage inspections. These documents indicated that the above discrepancies had been identified previously by QC. Improper segregation of cable reels had been documented as unsatisfactory in Inspection Report R90-1030 on March 1, 1990. The lack of a roof and missing and deteriorated protective covers had been documented numerous

times on workplan related inspections and on quarterly storage IR R90-3877 on August 20, 1990, and again on IR WBN-B-90-04971 on November 28, 1990. This IR documented jacket damage, identification, and inadequate cover problems on over 200 cable reels. In June 1990, DNE initiated PRD WBP900291P documenting the failure to store cable in accordance with the engineering requirements. In addition, the inspector noted that there were a number of unsatisfactory IRs related to cable, dating back to 1988, still outstanding. The TVA NQA Plan (TVA NQA PLN89-A), Revision 1, Paragraph 10.2.2.A specifies that, "NP organizations and on-site non-NP service organizations performing quality related activities at nuclear facilities shall promptly identify and solve adverse conditions. New engineering requirements for storing Class 1E cable were issued in 1987 (in response to a CAQR) and a workplan has required inspection and storage of Class 1E cable to these requirements since 1988. Also, DNE identified nonconformances with these requirements in June of 1990 but Class 1E cable was still being improperly stored on March 1, 1991. Part 50 of Title 10 of the Code of Federal Regulations, Appendix B, Criterion XVI, "Corrective Action," is implemented in part by the NQAP, Paragraph 10.2.2.A, which endorses ANSI N45.2-1971 (Section 16) and requires that TVA Nuclear Power organizations promptly identify and solve adverse conditions. This is identified as VIO 50-390/91-03-05, Inadequate Corrective Action.

The TVA NQA Plan, section 9.7.2.A.2, requires that the status of inspections be maintained through the use of indicators such as tags, markings, shop travelers, routing cards, stamps, inspection reports, or other suitable means. The inspector noted that the cable reels that were identified on unsatisfactory IRs were not tagged as such. The unsatisfactory IRs do not serve to status inspections because they are not logged to any particular component or commodity, i.e., to determine status one would have to review every outstanding IR to assure that the component or commodity was not listed. In addition, there does not appear to be any other "suitable means" in use to identify the status of inspection of these cable reels. For example, Reel 14653 (Mark #WFA-17) is listed on the computer tracking system and is tagged to indicate that it has been transferred to unit 1 Nuclear Stores and is available for issue to the field. However, outstanding unsatisfactory IR WBN-R-90-04971 lists this reel as being improperly stored. A similar deficiency was identified by the NRC as VIO 390/90-33-01, Failure to Disposition Nonconforming Conditions, in which problems on plant hardware noted on trouble tags were not identified, evaluated, corrected, tracked, trended, etc. The licensee committed to include the resolution of the deficiencies related to controlling unsatisfactory IRs for storage items in the response to VIO 390/90-33-01. The NRC will perform follow-up inspections on this new issue during closure of the existing violation.

The inspector requested NSD personnel to provide the latest report for the NSD storage area inspection of Hut 32 and adjacent cable storage area required by AI-5.6 to be performed annually. An unsigned inspection report dated October 20, 1990, was provided that indicated that all items

in the storage area were correctly segregated and were properly wrapped and protected. In addition, an NSD housekeeping inspection report on Hut 32 per AI-1.8, dated December 15, 1990, did not note any deficiencies with protective covering.

The inspector also notes that there was no indication in the workplan documentation that DNC or EQC personnel had ever documented any violations of the engineering requirements with regard to the storage and protection of Class 1E cable. It is not possible at this time to determine if any of the many cable reels that were identified during this inspection to be improperly stored and protected had the same or similar deficiencies at the time they were accepted by DNC and EQC. However, it seems highly improbable that all the deficiencies occurred after acceptance per the workplan.

In September 1990, the NRC identified a failure to perform QC inspections of storage areas, VIO 50-390/90-22-05. TVA's response to this violation stated that they had identified an additional condition adverse to quality (documented on PRD WBP900226P) that Nuclear Stores personnel had not been performing the quarterly material storage inspections as required by AI-5.6. The corrective action included retraining personnel to the inspection criteria and frequency requirements of AI-5.6 and performance of quarterly inspection and transmittal of reports to document control. Records show that training was conducted on September 24, 1990. The NRC inspector reviewed the AI-5.6 Appendix C quarterly inspection reports for Huts 3, 4, and 5, performed on September 25, 1990, which indicated all conditions were satisfactory in these huts. However, in the September 1990 time frame the NRC identified improper material storage and handling in this same area (VIO 50-390/90-22-09). TVA's response to this violation stated that corrective action included performance of a more detailed materials storage inspection of all Nuclear Stores storage locations. The NRC inspector reviewed the results of these more detailed inspections for Huts 3, 4 and 5 conducted February 21-25, 1991. These reports itemized over 150 discrepancies in these three huts. The inspector questions the adequacy of the training given to Nuclear Stores personnel and the adequacy of the existing material storage area inspection criteria and checklist provided by AI-5.6 The NRC will review TVA's evaluation of this issue as well as other corrective actions prior to closure of these violations.

The inspector also noted weaknesses in TVA's performance of the "more detailed inspections" discussed above. Although numerous inspection criteria had been tabulated on a three page walkdown checklist, there was no correlation between the itemized findings list and the checklist. In addition, although the checklist indicated that a minimum of 15 items were to be surveyed in each area, there was no listing of the items inspected, although it did appear that the inspections were thorough and the minimum had been met. There was no indication that any or all of the conditions noted constituted adverse conditions requiring documentation and

resolution in accordance with site corrective action procedures. This lack of specific guidance to Nuclear Stores personnel is similar to that discussed in paragraph 8 of this report regarding DCRM internal audits and assessments. Discussions with Nuclear Stores and DCRM personnel indicate that non-QA personnel at WBN have received no training in problem evaluation or auditing techniques. Training may have precluded the process weaknesses noted above and in paragraph 8 of this report.

During the review of workplan FY000A-Z the inspector noted that the procedure required verification that the cable reels were stored in accordance with the new Engineering Requirements. The original and Revisions 1 through 3 specifically noted that outside storage areas were required to be roofed and that the cable on all reels (inside and outside storage) must ("shall") be covered. However, Revision 4 (December 12, 1988), deleted the reference to the requirement for a roof and a February 1989, pen and ink change revised the requirement for covering reels in indoor (Level C) storage to an option ("may"). DNC personnel were unable to provide any justification or authority for these changes from the DNE specified Engineering Requirements of 47A100-2-0. Paragraph 6.1.2.A.3 of the TVA NQA Plan states that procedures and instructions shall include or reference appropriate technical requirements, including those in design output documents. Paragraph 7.2.5.A of TVA NQA Plan states that engineering requirements shall be identified in design output documents. Drawing 47A100-2-0 is the design output document identifying the engineering requirements for Class 1E cable. The failure to include or reference the technical requirements of the output document for the storage and protection of Class 1E cable in Revision 4 of workplan FY000A-Z is a violation of Criterion V of Appendix B to 10 CFR 50 and is identified as VIO 50-390/91-03-06, Inadequate Procedures.

7. Placement of CAQ Documents in Unit 2 Hold Status

As part of an evaluation of a concern reported to the NRC, the inspector reviewed the implementation of AI-7.11, Evaluation for unit 2 hold status. The inspector selected 35 CAQ documents that had been evaluated and placed in unit 2 hold status in accordance with AI-7.11, to determine whether they had been properly evaluated for potential effect on unit 1 equipment or activities. The following CAQRs did not appear to have been properly placed in unit 2 hold status in that, there was inadequate justification that the problem or corrective actions did not apply to unit 1 or were being addressed by other documents for unit 1:

a. WBP880274. The actual valve positions for quarter turn valves were opposite to the indicated position. The corrective action was to verify all the valves of this type had the proper indication. Corrective action had not been completed and there was no documented justification that this condition could not exist on unit 1.

b. WBP880541. An inadequate workplan had resulted in cable being pulled without QC inspection of de-termination and cable pulling. The CAQR was determined to be a programmatic deficiency because past recurrence control had been lacking or ineffective. No corrective action had been specified for this CAQR when it was placed in unit 2 hold. The programmatic issue block on the AI-7.11 evaluation form was checked "no."

c. WBP900143. A failure to follow procedures resulted in cutting a wrong conduit and all the cables in it. A safety incident report on this event initiated new "controls" and procedural steps via a memorandum. However, no corrective action was specified on the CAQR when it was placed in unit 2 hold status. Expected corrective action could include retraining or disciplinary action for personnel and revisions to procedures. No justification was provided that the causes of this event and needed actions to prevent recurrence did not apply to unit 1 activities. This CAQR was included in Inspection Report 390,391/90-31 as part of Example 1 of Violation 390,391/90-31-01.

d. WBP880022. Electrical cable conductors were terminated to the wrong termination points. The CAQR does not address how or why this error occurred, any extent of condition, or any needed action to prevent recurrence.

In November 1985, SCR 6479-S was issued against unit 2 documenting a lack of control for inspection and calibration of 8, 12, and 40 ton removable crimping dies. Partial corrective action was specified which included reinspecting all of the subject dies, marking of two piece dies, reinstruction of personnel, revision of procedures to document the dies used, and a reference to an ongoing investigation by electrical engineering to determine corrective action for previously installed terminals. The engineering report section of the SCR stated that this was a potential generic problem at all plants and that the office of construction shall initiate a program to determine the acceptability of installed crimps and correct any unacceptable crimps. A memorandum dated January 17, 1986, from the Engineering Project Manager to the Construction Project Manager stated several disagreements with the SCR as written and also indicated that the Office of Construction should initiate a program to determine the acceptability of installed crimps and that the condition could exist at any plant. In September 1988, the SCR was evaluated for unit 2 hold status and determined to be a programmatic problem and was not authorized for unit 2 hold status. However, when the NRC inspector requested the status of this SCR in February 1991, the TROI system indicated it to be in unit 2 hold status. TVA is investigating to determine how this SCR was erroneously placed in unit 2 hold status and whether it was an isolated case.

TVA has issued SCAR WBSCA910169 to document and resolve these deficiencies. The failure to promptly identify and take corrective actions for conditions that could adversely affect unit 1 material or

activities is a violation of Criterion XVI of 10 CFR 50, Appendix B. This violation is identified as an example of VIO 50-390/91-03-05, Inadequate Corrective Action.

8. Drawing and Document Control

As part of an evaluation of a concern reported to the NRC, the inspector reviewed TVA's process for controlling the distribution and updating of drawings and manuals. The concern reported to the NRC involved a large number of drawings (approximately 13,000) that had not been included on a new computer database for controlled drawings (on the SYS 3 computer) during a transition of information from the old database (on the PRIME computer) in the Fall of 1989. The concerned individual had stated that an internal DCRM audit had identified that the drawings needed to be added to the new database. The CI was concerned that work may have been performed in accordance with outdated drawings because of this error.

The TVA Program Manager had responded in a memorandum to a similar ECP inquiry that an internal DCRM audit conducted in January and February 1990, had identified 1,021 drawings that had not been added to the new SYS 3 database. The memorandum also stated that a follow-up review had indicated that none of the drawings had been revised during the time between issue to users and the time the drawings were listed on the controlled distribution list. Discussions with personnel involved in the drawing transition process indicate that the 13,000 figure was an approximation from a printout of all drawings on the PRIME system. When the audit of one location identified a large number of discrepancies, DCRM personnel initially thought that none of the 13,000 had been transferred. Later reviews indicated that most of these drawings (those that had a prior distribution) had actually been transferred over to the SYS 3 database.

The NRC inspector identified several programmatic weaknesses related to the process and documentation of DCRM internal audits and assessments. The DCRM staff was unable to provide either an internal audit form for the audit in question (a form routinely used by DCRM to conduct audits, but not specified in any procedure). No documentation of the follow-up review was available either. DCRM personnel did provide an unsigned, handwritten listing of approximately 1000 drawings as documentation of the audit findings. A note on this document ("dwgs-finished adding 4-27-90") apparently indicating the addition of these drawings to the SYS 3 database. The NRC inspector reviewed 21 additional audit reports for internal DCRM audits conducted during January, February, and March 1990. During this review the inspector noted one report (dated February 15, 1990) of 2,031 drawings in the procedures upgrade project that was unsigned and contained only the notation "Complete disarray." DCRM personnel could provide no documentation to show that this problem had been corrected or more formally documented.

In addition, the DCRM audit forms do not have an error code or otherwise indicate that any additional drawings were found that were not on the distribution list, i.e., the same situation as identified in the one location with 1,021 "extra" drawings. Thus, it is not possible to determine if the previous audits were based on a check of what a location possessed versus what it was supposed to have, or on merely whether the location had the latest revision shown on a distribution printout. The DCRM personnel who performed the audits in early 1990 stated that the actual drawings in place were checked against the distribution printout--the most thorough method of audit. However, there are no documented instructions or objective evidence that this approach was used.

AI-4.3, "Controlling Drawings" and AI-4.8, "Controlled Manuals" require DCRM to perform yearly audits and assessments of controlled documents and drawings. However, these AIs do not provide specific guidance as to how to perform the audits, how to document the scope of the audit or any identified discrepancies, the threshold for issuance of a more formal CAQ document, any retention time for the audit reports, or who is to be on distribution for the findings. In addition, there are no other written instructions or procedures in DCRM to address any details for the required audits.

TVA's NQAP, Paragraph 6.1.1, and 10 CFR 50, Appendix B, Criterion V, require that quality related activities be prescribed by documented procedures and instructions. **The failure to have adequate documented instructions for performance of internal DCRM audits and assessments is identified as an example of VIU 50-390/91-03-06, Inadequate Procedures.**

TVA has committed to perform new audits of the 1,021 drawings identified as not being on controlled distribution in the early 1990 audit and the location where the controlled drawings were noted to be in "total disarray." These new audits are scheduled to be completed by March 29, 1991. **TVA has also committed to issuance of a DCRMI to detail the process and controls for performing the internal audits and assessments required by AI-4.3 and AI-4.8.**

9. Sealing of Spare Conduit Sleeves

In response to a concern reported to the NRC, the inspector reviewed the implementation of corrective action related to improper identification and sealing of spare conduit sleeves. These issues were documented on CAQRs WBP870307 and WBP870389. CAQR WBP870389 addressed the use of plastic caps instead of the required steel caps in unused sleeves. Corrective action for this CAQR is complete and has been independently verified by QA. The inspector reviewed completed workplan C-WBP870389-1, revised drawings 45W812-2 and 45W885-2 and revised procedure CPI-8.1.8-H-400 and General Specification G-40 which addressed this portion of the issue. TVA's actions were adequate.

CAQR 870307 addressed improperly identified and sealed conduit sleeves that were used as pass-throughs for other items such as smaller conduits, temporary cables, etc. Corrective actions include correlating various sleeve designator systems, revising drawings, reviewing of sealing documentation, and inspection and rework of sleeves as required. Little action to resolve the CAQR has been taken to date. To track the completion of corrective actions for this CAQR the NRC is opening IFI 50-390/91-03-07, Sealing of Spare Conduit Sleeves.

10. Crimping of Class 1E Cable Terminations and Splices

As part of an evaluation of a concern reported to the NRC the inspector reviewed TVA's corrective actions to several CAQ document's addressing discrepancies in the crimping of splice connectors and terminal lugs on Class 1E cable. In 1984 NCR 5827 (designated as common-not restricted to either unit) was issued detailing a loss of control for calibration of crimping dies for installing Class 1E cable splice connectors and termination lugs. This NCR was closed on March 6, 1985, with corrective action specified as retraining of personnel on calibration requirements, revision of a Quality Control Procedure to require recording of crimping tool calibration dates and evaluation of 35 crimping tools that had not been recertified when required by procedure. No inspections of field installations were performed because the recertified tools were found to be acceptable.

In December 1985, NCR 6536 was issued, against both units 1 and 2, documenting that site procedures specified that a certain cable splice connector that was only rated at 600 volts was used on 6.9kV rated cable. Corrective actions included determination of all 6.9kV splices installed in cable that was essential to safe operation or shutdown of the plant, inspection of identified splices and rework as required, revision of General Specification G-38 to specify the proper splice connectors for medium voltage cable, and revision of procedures to specify proper connectors and tools for 6.9kV butt splices. Twenty-three splices in 19 cables were identified as needing evaluation. During the inspection process it was determined that three cables with one splice each had previously been removed or replaced. The inspection and rework were performed in accordance with workplan N6536-1. Corrective actions were completed and the workplan and NCR 6536 were closed in March 1988. The condition reported on NCR 6536 was determined to be significant and SCR 6536-S was issued. Corrective actions were the same as for the NCR. This SCR remains open.

The inspector reviewed completed Workplan N6536-1. Although none of the cable splices were found to have the improperly rated connectors installed, improper crimping and connector installations were identified. The NRC inspector identified the following concerns related to this workplan:

a. The completed workplan does not have documentation for the inspection of four splices listed as requiring inspection, one of two on cable PP470A, one of two on cable 1PP675A, one of two on cable 1PP587A and one of two on cable 2PP675A.

b. The workplan required inspecting one of the three conductors on each cable and inspecting the remaining two conductors only if the first was found deficient. Although discrepant conditions requiring rework were identified on 6 of the 16 initial conductors inspected (a 38 percent reject rate) and on 7 of the 12 conductors inspected on the other phases of the initial rejects (a 58 percent reject rate), no revision was made to the workplan or NCR to inspect the remaining 20 conductors on cables where the first phase conductor had passed the inspection. In addition, although the inspection determined that 47 percent of the connections examined were inadequate, no additional corrective action was taken to determine if the discrepancies noted (excess exposed conductor, filed conductors, excessive crimp, inadequate crimp, no crimp) existed on other Class 1E crimped splices and terminations.

c. Although none of the underrated splice connectors were found installed, inspections were still performed to the acceptance criteria in the workplan and crimps were reworked and connectors replaced without a change to the workplan. The inspector is concerned that the inspection and rework activity may not have been properly performed.

The TVA NQAP and 10 CFR 50, Appendix B, Criterion XVI require that adverse conditions be promptly identified and corrected. The failure to inspect four of 23 specified splices in Workplan N6536-1 and the failure to take additional corrective action after determination of numerous deficiencies in Class 1E crimped splice connector installations during performance of Workplan N6536-1 are identified as examples of VIO 50-390/91-03-05, Inadequate Corrective Action.

11. Seismic and Civil Status Review

On February 26, 1991, the inspector discussed the outstanding issues relative to the engineering efforts on civil and seismic evaluations. Engineering provided the following status for these issues.

a. Seismic

- Activities in progress include updating and revision of calculations.

- Engineering evaluation of structural features for seismic comparison is continuing.

- The activities in progress include updating and revision of 12 seismic CEB reports.

The licensee advised that there are no change to the scope of work and there are no field activities planned at this time.

b. Large Bore Piping and Supports

- Reconcile analysis with the design changes that are in progress. The engineering effort for Group 1 is complete.

- Engineering work for systems 30, 31, 32, 67, and 70 is complete.

- Engineering is on schedule for completing analysis and issuing modifications to construction on other systems. The licensee has recently reduced the number of engineers assigned to this effort. This reduction will result in "stretching" out the planned completion schedule and the licensee has not established a firm completion date.

The field activities include the rework of approximately 2,200 hangers. The field work is completed for system groups 1 and 2A.

c. Small Bore Piping and Supports

The qualification and load rating of typical supports designs have been completed.

The following activities are in progress:

- The walkdown of piping and supports to gather information to establish the attributes is 90 percent complete.

- The evaluation and load rating of supports variances is 30 percent complete.

- The piping analysis and pipe support design evaluations are 5 percent complete.

- The issuance of modifications is in progress and approximate 125 modifications are required on system 70. The amount of modifications on other systems is not yet known by the licensee.

- The CAD drawings for small bore piping is in progress and to date approximately 340 drawings are completed of approximately 1,040 required.

The licensee has reduced the amount of engineering effort on this program by approximately 50 percent. This will extend the completion of the engineering effort by approximately six months.

d. Instrument Lines and Supports

- A reassessment is in progress for reconciliation of instrument lines and the effort is approximately 18 percent complete.

- A reassessment is in progress for reconciliation of radiation monitoring and sample lines and the effort is approximately 8 percent complete.

As a result of the above reconciliation efforts, no modifications have been issued. The modifications for instrument line slope are currently on hold due to the construction stop work order.

e. Equipment Seismic Qualification

- The engineering evaluation of the B-19 type hangers is complete.

- The engineering evaluation of ASCO solenoid valves is complete.

- Loading of the Q-list in the ESQ binders is complete.

- The walkthrough training is complete.

- The procedure to control the ESQ binders is in progress.

The licensee currently is performing the walkthroughs and no specific modifications are identified at this time except the mounting of the ASCO valves and the B-19 instrument mounting.

f. Platforms

- The walkthrough of 123 platforms in support of the selection of 20 worst case platforms was completed by engineering.

- Twelve of the platforms selections are in various stages of design and are 40 percent complete.

- Seven additional platforms have been selected.

- The database for the 20 platform critical attributes is being developed.

- The methodology to assess the impact on remaining platforms due to attributes that caused the modification in the 20 worst case platforms is in progress.

The field activities include the collection of additional data for G-32 spacing violations is being obtained for embedded plates.

Also the field walkdown of the seven worst case platforms is in progress.

g. Steel Thermal Issues

- The design considerations for thermal considerations and the calculation that documents thermal selection is complete.

- The calculation for qualification of worst case sub-sets is in progress.

The licensee has no field activities ongoing at present.

h. Pipe Whip Restraints

- The licensee completed the review of 10 selected pipe whip restraints calculations.

- The licensee completed the walkdown of embedded plates in the south valve room and reactor building and is evaluating five structures in the valve room considering the increase of environmental temperatures.

The licensee has no field activities on this item at this time.

i. Steel Containment Vessel Penetration and Pad Plates

- The DCN for composite drawings has been prepared and is being reviewed by engineering.

- The review of HVAC, Airlock and equipment hatch calculations is continuing.

- The pad plate review is continuing.

- The review of non-process penetration calculations is continuing.

- The thermal movement analysis is continuing and planned to be issued March 4, 1991.

- The methodology for thermal analysis has been issued.

The licensee does not have any field activity ongoing on this issue at this time.

The inspector had no further questions on this matter at this time.

12. Action on Previous Inspection Findings (92701)

(Open) VIO 50-390, 391/87-05-01, Hydrogen Analyzer Deficiencies

During this inspection period the licensee provided the following status update:

NRC violation 390, 391/87-05-01, Part 1, identified the following concerns regarding the hydrogen analyzers:

- Slope of the process tubing;
- Maximum vertical height between process tap and instrument; and
- A generic concern with implementation of vendor requirements.

SCRs WBNEEB8702 (unit 1) and 8703 (unit 2) were issued to track the specific hydrogen analyzer deficiencies.

CAQR WBP870701 was issued to track the generic deficiency regarding inadequacy in the implementation of vendor requirements.

In response to the NRC violation, TVA committed to:

- Implement the appropriate vendor requirements for the hydrogen analyzers;
- Revise design output documents to address similar future installations; and
- Implement the Vendor Information CAP plan to address installed equipment generically.

In addition to the deficiencies identified by NRC, three other deficiencies were later identified by TVA with respect to the hydrogen analyzers. The following documents track these deficiencies.

- CAQR WBP880279, hydrogen analyzer not designed as a closed system outside containment as required by FSAR.
- CAQR WBT880286, isolation valves not included in the design as required by design criteria.
- CAQR WBP890536, solenoid valve location and configuration in the process lines.

CAQR WBP900397 was issued to consolidate the corrective action plans for the specific hydrogen analyzer deficiencies identified by SCR WBNEEB8702, WBP880279, WBT880286, and WBP890536. (Each specific corrective action associated with the four corrective action plans was included in the new CAQR.)

The CAQRs WBP870701 and WBP900397 are currently being rolled over into the new corrective action program and will be tracked as WBP870701 PER and WBP900397SCA, respectively.

The specific deficiencies for the hydrogen analyzers will be completed as part of Special Project "Containment Hydrogen Analyzer."

- The design output specific to future installations of gaseous instrument sense lines has been issued. (Design Specification N3E-934)

- Design Change Notices for the specific hydrogen analyzer deficiencies have not been issued.

- The Vendor Information CAP is approximately 40 percent complete.

13. Exit Interview

The inspection scope and findings were summarized on March 14, 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
50-390/87-05-01 50-391/87-05-01	Open	VIO - Hydrogen Analyzer Deficiencies (Paragraph 12)
50-390/91-03-01 50-391/91-03-01	Open	URI - RCS Cooldown Due to AFW Design (Paragraph 2)
50-390/91-03-02 50-391/91-03-02	Open	URI - Applicability of Generic Reviews for WB (Paragraph 2)
50-390/91-03-03 50-391/91-03-03	Open	URI - Update of CPIs due to G-Spec Revision (Paragraph 3)
50-390/91-03-04 50-391/91-03-04	Open	IFI - Observation of Negative Trends (Paragraph 4)
50-390/91-03-05 50-391/91-03-05	Open	VIO - Inadequate Corrective Action (Paragraph 6, 7, and 10)
50-390/91-03-06 50-391/91-03-06	Open	VIO - Inadequate Procedures (Paragraph 6 and 8)
50-390/91-03-07	Open	IFI - Sealing of Spare Conduit Sleeves (Paragraph 9)

14. List of Acronyms

AFW	Auxiliary Feedwater
AI	Administrative Instruction
ANSI	American National Standards Institute
ASTM	American Society of Testing Materials

CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAQR	Condition Adverse to Quality Report
CCD	Configuration Controlled Drawing
CCS	Component Cooling System
CEB	Civil Engineering Branch
CFR	Code of Federal Regulation
CI	Concerned Individual
CPI	Construction Process Instructions
DBD	Design Basis Documents
DBVP	Design Baseline Verification Program
DCD	Design Change Document
DCN	Design Change Notice
DCRM	Document Control and Records Management
DCRMI	Document Control and Records Management Instruction
DNC	Division of Nuclear Construction
DNE	Division of Nuclear Engineering
ECP	Employee Concern Program
EOP	Emergency Operating Procedures
EQ	Equipment Qualification
EQC	Electrical Quality Control
ERCW	Essential Raw Cooling Water
ESQ	Equipment Seismic Qualification
F	Fahrenheit
FSAR	Final Safety Analysis Report
G-Spec	General Construction Specification
gpm	Gallons Per Minute
HVAC	Heating, Ventilating, and Air Conditioning
IDI	Independent Design Inspection
IFI	Inspector Follow-up Item
II	Incident Investigation
IR	Inspection Report
MDAFW	Motor Driven Auxiliary Feedwater
MS	Main Steam
NCR	Nonconformance Report
NEP	Nuclear Engineering Procedure
NP	Nuclear Power
NQA	Nuclear Quality Assurance
NQAM	Nuclear Quality Assurance Manual
NQAP	Nuclear Quality Assurance Plan
NRC	Nuclear Regulatory Commission
NSD	Nuclear Stores Department
PCV	Pressure Control Valve
PEG	Procurement Engineering Group
PER	Problem Evaluation Report
PLS	Precautions, Limitations, and Setpoints Document
PM	Preventive Maintenance
PRD	Problem Report Document
QA	Quality Assurance
QC	Quality Control

RCS	Reactor Cooling System
RHR	Residual Heat Removal
RIMS	Record Information Management System
SCAR	Significant Corrective Action Report
SCR	Significant Condition Report
SD	Standard Drawing
SG	Steam Generator
SI	Surveillance Instruction
SIP	Specification Improvement Program
SQA	Site Quality Assurance
SQN	Sequoyah Nuclear Plant
SRN	Specification Revision Notice
STD	Standard
SU	Start-up
SYS	System
TDAFW	Turbine Driven Auxiliary Feedwater Pump
TROI	Tracking and Reporting Open Items
TVA	Tennessee Valley Authority
URI	Unresolved Item
VIO	Violation
WBEP	Watts Bar Engineering Project
WBN	Watts Bar Nuclear Plant
WP	Workplan