UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report Nos: 50-390/83-27 and 50-391/83-19

Licensee: Tennessee Valley Authority
500A Chestnut Street
Chattanooga, TN 37401

Docket Nos: 50-390 and 50-391

License Nos: CPPR-91 and CPPR-92

Facility Name: Watts Bar 1 and 2

Inspection at Watts Bar site near Spring City, Tennessee

Inspectors: LJ Watson for T. L. Heatherly — 8/24/83 Date Signed

LJ Watson for W. Swan — 8/24/83 Date Signed

LJ Watson for S. Butler — 8/24/83 Date Signed

LJ Watson for E. Ford — 8/24/83 Date Signed

Approved by: C. Julian for D. R. Quick, Section Chief — 8/24/83 Date Signed
Project Branch No. 1
Division of Project and Resident Programs

SUMMARY

Inspection on June 21 - July 22, 1983

Areas Inspected

This routine, announced inspection involved 423 resident inspector-hours on site in the areas of licensee action on previous enforcement items; NSRS "mini management" review; followup on nonroutine events; preoperational test witnessing; preoperational test results evaluation; observation of work; review of procedures; structural concrete building for fifth diesel generator; independent inspector effort and followup on licensee identified items.

Results

Of the ten areas inspected, no violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

G. Wadewitz, Construction Project Manager
W. Cottle, Plant Superintendent
*H. Fischer, Assistant Construction Engineer
*C. Christopher, Assistant Construction Engineer
*T. Hayes, Nuclear Licensing Unit Supervisor
*A. Rogers, QA Supervisor-Construction
*J. Englehart, Compliance Engineer

Other licensee employees contacted included ten engineers.

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on July 22, 1983, with those persons indicated in paragraph 1 above.

3. Licensee Action on Previous Enforcement Matters

a. (Closed) Violation (390/80-23-02; 391/80-17-02) Failure to Write a Nonconforming Condition Report (NCR). The violation identified a failure to write an NCR for noted field deficiencies; consequently, affected organizations did not properly review the deficiencies. Deficiencies included defective Kerotest valves with unspecified corrective action; replacement packing that was not subsequently specified on drawings; and a lack of specifications and review for RWST anchor bolt modifications.

In response to the violation, the licensee initiated NCR 2501 R for defective Kerotest valves and subsequently reported deficiencies to the Commission. See paragraph 13.b of this report.

Concerning packing replacement, Grafoil packing replaced John Crane packing and drawings were updated to reflect the change.

The RWST anchor bolt modification was properly reviewed and corrected. The previous inappropriate method, Design Information Request (DIR), that identified the deficiency, is no longer used by TVA. Based upon review of corrective actions and field verification, this item is closed.

b. (Closed) Violation (391/83-09-01) Failure to Follow Quality Control Instruction for Structural Concrete. The violation was in two parts:

(1) Unavailability of certified mill test reports for deliveries.

(2) Failure to prepare an NCR on a failed concrete specimen test.

The licensee denied item (1) of the violation after the missing mill test reports were located. The filing location for these reports had been changed from the Warehouse Service Unit to the QC Records Unit. The inspector reviewed the CMTRs and verified their storage in the QCR vault.

The licensee admitted item (2) of the violation and prepared NCR 4798 RO. Site civil engineering evaluation to "use-as-is" was concurred in by Engineering Design (CEB) on the basis that extrapolation of the curve for strength gain for this concrete mix showed that the strength gain from the 28-day test to 90 days could be expected to be 1200 PSI, giving a 90-day strength of 3540 PSI, well above the required 3000 PSI compressive strength for the wall concrete. The NCR was closed June 1, 1983.

To prevent recurrence, Civil QC - Unit B personnel were reinstructed on May 18, 1983, on WBNP-QCI-1.02, "Control of Nonconforming Items" and were in full compliance by May 23, 1983. The inspector reviewed the licensee's actions and documentation and judged them to be adequate. This violation is closed.

c. (Closed) Violation (390/81-16-01) Failure to Follow Procedures. The violation identified a failure to follow procedures for installation and cleanliness controls during maintenance of safety related equipment. Specifically, a Flexitallic gasket had been installed incorrectly and apparently without authorization. The piping system had been left open and unattended during maintenance activities.

After reviewing the licensee's response and in subsequent discussions, the inspector determined that the gasket was installed correctly. The "dishing shape" of the installed gasket was determined to be adequate per the manufacturer.

The lack of cleanliness controls revealed a significant training deficiency. In response, the craft superintendent revised the approved training program in total. During the past two years, the inspector has held discussions with the superintendent and through interviews with selected craftsmen has determined the training to be adequate. Craftsmen are trained biweekly in Quality Control Procedures applicable to their work. All new employees are given a basic QA indoctrination and safety rules lecture. The inspector has, on several occasions, witnessed work activities which reflected craft training. These inspections were documented in previous IE reports and included

witnessing such activities as pipe changeout in the ERCW system, bolt anchor installation and testing, pipe support installation, cable installation and major valve maintenance.

The craft training effort, developed as a subset of the overall work plan/work package program appears to have given the crafts a better sense of direction and clearer understanding of the purpose of interfacing organizations, i.e. engineering and QC. All of the craftsmen interviewed stated that even though the program is a slower process, it is a more controlled one and should enhance overall plant safety. The inspector made the same conclusions. This item is closed.

d. (Closed) Violation (390/81-26-01 and 391/81-24-01) Failure to Include Provisions for Ensuring Environmental Suitability of Materials in Containment. The violation identified a failure to qualify epoxy resin grout for use in containment.

The licensee's corrective actions consisted of: revising General Construction Specification G-32, "Bolt Anchors Set in Hardened Concrete" to prohibit use of epoxy grout on anchor bolts on safety-related structures; identifying 72 supports inside the Containment for which epoxy grout was specified; conducting a mathematical model analysis of the steam generator anchor bolts with sustained temperatures of 120°F on the epoxy grout at the head of the anchor; conducting tests at the Singleton Materials Engineering Laboratory on epoxy grouted anchors which revealed reduction of reliable mean capacity at elevated temperatures; reviewed published information on epoxy polymers of the type used showing no loss of strength because of radiation dose levels expected during the life of the plant; issued on May 31, 1983, Civil Design Standard DS-C1.7, "General Anchorage to Concrete," which also prohibits use of epoxy grout in safety-related structures.

The senior construction resident has reviewed the documentation and discussed the matter with TVA's civil engineering and nuclear licensing units. The documentation is acceptable.

Any required modifications to anchors in the containments will be effected under NCR 3567R and reported on 10 CFR 50.55(e) item WBRD-50-390/81-71, WBRD-50-391/81-67.

This item is closed.

e. (Closed) URI (390/81-11-03, 391/81-11-02) Lack of Westinghouse QA Review On UHI Valve rework. The inspector reviewed the licensee's final report for WBN NEB 8103 which stated that Westinghouse has inspected the reworked UHI valves and issued Quality Releases (QR) and that the QR's have been received and accepted by TVA. The inspector reviewed the QR's and discussed the inspections that were performed with cognizant vendor personnel. The inspector determined that the onsite QR inspection done on the Unit 2 UHI valves was equivalent to

the pre-release inspection done for the Unit 1 valves. These items are closed.

f. (Closed) URI (390/81-11-05, 391/81-11-03) Differences between Westinghouse and TVA Flow Diagrams. The inspector reviewed the unresolved item and determined that differences found in Westinghouse supplied flow diagrams were due to the fact that licensee initiated design changes are not required to be reflected in changes to the vendor supplied drawings. It did not appear that this would have an adverse impact on safety-related activities in that the licensee is required to maintain their safety-related drawings, including flow diagrams, in a current "as constructed/as designed" status. The unresolved item is closed.

The inspector determined that the Final Safety Analysis Report (FSAR) drawings for Nuclear Steam Supply Systems (NSSS) supplied by the licensee are actually Westinghouse drawings. In that these drawings do not necessarily reflect the actual plant configuration, the licensee has been requested to submit updated FSAR drawings. This item will remain open until FSAR NSSS drawings are replaced with current drawings (390/83-27-01; 391/83-19-01).

g. (Closed) URI (391/83-09-02) Disposition of NCR 4589 - Concrete Curing. On July 19, 1983, a regional inspector found that NCR 4589 (which documented failure to protect the construction joint surface of two newly placed concrete wall sections against loss of moisture) had been voided on January 26, 1983. The inspector judged that the NCR voidance was not justified. The licensee immediately reactivated the NCR by issuance of Revision 1 and forwarded the matter to the Civil Engineering Branch (CEB) of Engineering Design (EN DES) for evaluation.

The resident inspector found that the NCR had been voided only after conference consideration. Craft management, civil engineering, and civil quality control personnel had met on January 17, 1983, and had confirmed that the joint surface of the two wall placements had been improperly exposed to loss of moisture, that there had been a breakdown of communication between craft and QC personnel on curing in this instance, that craft personnel should be retrained in WBNP QCP 2.02, "Concrete Placement and Documentation", but that strength gain of concrete adjacent to the joint should not be permanently inhibited.

Retraining of craft personnel was accomplished on February 1, 1983.

On January 20, 1983, the site civil engineering supervisor had noted on the NCR: "Pour ADGB-9j was placed on 1/12/83 and ADGB-8m was placed on 1/14/83. These pours were unprotected from moisture loss for a maximum of 96 and 48 hours respectively. Although this is not a good practice, this interruption in curing should not permanently inhibit strength gain. The ultimate strength of the pour should therefore be acceptable."

On June 17, 1983, the EN DES Watts Bar Design Project Manager reported: "EN DES has reviewed NCR 4589 R1 and has determined the subject concrete to be acceptable providing that expansion anchors will not be installed in the area of low strength concrete. Considering the meteorological conditions during the 96-hour period in which the concrete surfaces (horizontal construction joints) were unprotected from moisture loss and that temperature protection was provided, it has been concluded that the concrete will gain at least 75% of the specified 28-day compressive strength of 3000 PSI. This reduced strength will not impair the structural integrity of the walls in which the unprotected joints occur. However, EN DES forbids the use of expansion anchors within a range of five inches below to three inches above the joint atop pour 8m at elevation 754.0 feet. EN DES requires that the necessary measures be taken to ensure this. Pour 9j may be neglected due to its position in the wall which locates the unprotected joint against the bottom face of the floor slab above, making the joint inaccessible to anchor installation."

The licensee's June 29, 1983, summary of Concrete Test Results, Mix 301.5AFW (designed to attain 3,000 PSI compressive strength at 28 days), shows that for the last 30 cylinders tested, the average strength at 28 days was 3,730 PSI and at 90 days was 5,106 PSI. Concrete continues to gain strength as it ages, well beyond the 90 day strength.

On July 16, 1983, the resident inspector confirmed that the licensee had installed striped tape five inches below and three inches above the construction joint and had stenciled on the concrete an instruction that no anchors were to be installed in the outlined area of concrete.

The resident inspector judged that the licensee's evaluations were valid and that, although disposition of the original NCR through EN DES rather than voidance might have been preferable, voidance did not justify a citation of violation.

This item is closed.

h. (Closed) Unresolved item (390/82-06-01; 391/82-04-01) MSIV Internal Locking Devices. IE Information Notice 81-33 identified that locking devices for MSIVs had not been properly installed. In a prior IE inspection (390/82-06-01) TVA committed to open one MSIV to ensure that internal devices were installed properly.

On July 15, 1983, the inspector witnessed disassembly of a Unit 2 MSIV. Internal locking devices for the poppet assembly and all other internal parts were verified to be installed correctly. A light rust coating was noted which craft personnel removed. This item is closed.

i. (Closed) IFI (390/81-29-05; 391/81-26-05) Surveillance Program Development. The item identified that not all surveillance requirements as defined in Technical Specifications had been incorporated into procedures.

Since Technical Specification have not yet been approved, the inspector reviewed the licensee's Administrative Instruction (AI)-6.1, Surveillance Test Program, to ensure management controls were adequately defined to implement and conduct TS surveillance requirements upon issuance of the license. Surveillance requirements procedures have been and will continue to be reviewed for adequate implementation on a periodic basis.

AI-6.1 contained the following instructions to ensure that TS surveillance requirements were performed and documented within specified time frames:

- A review of all data for technical adequacy and the proper disposition of any discrepancies shall be conducted by a cognizant individual not involved in the performance of the test.

- A timely review of all data sheets for completeness, adherence to quality assurance requirements, and to ensure that acceptance criteria are met shall be performed by QA staff personnel.

- The Plant Services Unit Supervisor shall establish, maintain and verify a surveillance test schedule and document control system that specifies applicable surveillance requirements, schedules, applicable instructions, data review and document control.

- Each instruction shall contain a cover sheet that contains a title, system name, revision level, unit, distribution, approval signature, and date. The surveillance instruction numbering system is based on Technical Specification section numbers.

- Documentation requires a statement of purpose and description of surveillance requirement and associated Technical Specification. Applicable modes for the limiting condition of operation of the equipment being tested shall be stated.

- Instructions shall include acceptance criteria against which the success or failure of the activity can be judged.

- Surveillance testing must be performed on the function or system following maintenance, repair or calibration to ensure operability.

- Prerequisites required notification of affected personnel, valve lineups and special test equipment.

- The main body of instructions required step-by-step instructions for task performance and included steps for limiting temporary alterations and the use of reliable instrumentation.

- Instructions included provisions for incorporating Technical Specification changes.

- Instructions included steps to ensure prompt notification of affected personnel for noted failures.

These instructions in addition to other required steps, should ensure that Technical Specification requirements will be met.

This item is closed.

j. (Closed) IFI (390/81-29-03; 391/81-26-03) Procedures for Trend Analysis. The inspector identified that the licensee had not developed procedures for trending maintenance deficiencies as required by ANSI N18.7 Section 5. Subsequently the licensee developed AI-9.2, "Maintenance Requests and Equipment Maintenance History", that required performance of trend analysis of repetitive and generic maintenance deficiencies. The inspector reviewed section 6 of the procedure and noted that, on a quarterly basis, computer listings of repetitive and generic deficiencies were required to be transmitted to responsible groups for review and subsequent corrective action. The inspector assessed these actions as adequate.

This item is closed.

k. (Closed) IFI (390/81-29-01; 391/81-26-01) Procedure Review Following Unusual Incidents. ANSI N18.7 section 5.2.15 requires that applicable procedures be reviewed following an unusual event, such as an accident, an unexpected transient, significant operator error or equipment malfunction.

The inspector reviewed AI-3.1 and identified that the licensee had incorporated the ANSI N18.7 requirement. Section 4.7.4 of the AI stated that responsible supervisors shall ensure that procedures are reviewed following an unusual incident, such as an accident, an unexpected transient, significant operator error, or equipment malfunction.

This item is closed.

l. (Closed) IFI (390/83-08-03; 391/83-07-02) Followup on ERCW Spraydown Event. This item was opened to ensure that the licensee investigated for any apparent damage done due to spillage of ERCW water into two areas of the auxiliary building. In a meeting with the plant superintendent on June 28, 1983, the inspector was advised that no apparent damage had occurred. On June 18, 1983, the inspector toured one of the two affected areas and noted no apparent damage.

This item is closed.

m. (Closed) TMI (80-RD-41)NUREG 0660 Item III.A.3.6 Interaction With Other Agencies. No licensee actions are required for this task.

This item is closed.

n. (Closed) TMI (80-RD-28) NUREG 0660 Item II.J.4.1 Deficiency Reporting Requirements. No licensee action required.

This item is closed.

o. (Closed) TMI (80-RD-27) NUREG 0660 Item II.J.2.3 Assign Resident Inspectors To All Construction Sites. This task requires no action by the licensee.

This item is closed.

p. (Closed) TMI (80-RD-26) NUREG 0660 Item II.J.2.2 Increased Emphasis On Independent Measurement in the Construction Inspection Program. No licensee action required.

This item is closed.

q. (Closed) TMI (80-RD-08) Control Room Access. The inspector reviewed commitments made in response to NUREG-0737 requirement 1.C.4. The licensee developed AI-2.1, "Authorities and Responsibilities for Safe Operation and Shutdown," which contained control room access requirements. Section 3.12 established the following guidelines: 1) Access is limited to persons who have a need or are required to be in the control room; 2) during normal plant operation, permission is required from the unit operator (UO) or assistant shift engineer (ASE) for entrance into the "horseshoe"; 3) the UO, ASE or SE has the authority to terminate activities and/or expel persons from the control room if it is determined that the condition is adversely affecting the operator's capability to operate safely; 4) during emergency conditions only persons approved by the SE or site emergency director may be present in the control room. A public safety officer will be stationed during radiological emergencies to ensure these instructions are met; and 5) during plant trips and transients only specific individuals are allowed control room access. Section 4.2 of the instruction stated that the SE has overall responsibility for control room access and discipline. The inspector assessed these controls and found them acceptable.

This item is closed.

r. (Closed) TMI (80-RD-05) Resident Inspector at Operating Reactors. The Resident Inspector (RI) reported to WBNP in December 1979. The Senior Resident Inspector (SRI) reported to WBNP in March 1980. The RI was subsequently promoted to SRI in September 1982, after the former SRI

left the NRC. In January 1983, the SRI for construction reported to WBNP. On July 7, 1983, the new RI for operations reported to WBNP. Placement of these inspectors satisfied manning requirements defined in Task 1.B.2 of NUREG-0660.

This item is closed.

s. (Closed) TMI (80-RD-20) Containment Dedicated Penetrations - Hydrogen Control - NUREG 0737 Item II.E.4.1. The NUREG defined the need to install dedicated combustible gas control penetrations. The NUREG further required that procedures for the use of the combustible gas control systems be reviewed and revised as necessary.

Watts Bar utilizes two H_2 recombiners per reactor. The recombiners are within containment with no penetrations necessary. System Operating Instruction (SOI)-83.1 was reviewed and found to be adequate.

This item is closed.

t. (Open) Violation (390/80-30-01; 391/80-23-01) Failure to Report Significant Deficiencies to the Commission. The violation identified that the licensee had failed to report two significant deficiencies. One third of the 1,312 spent fuel rack cells had not met fabrication acceptance criteria and several hundred safety-related valves installed in systems had nameplate and other supplied certification documentation which did not match procurement specifications.

Corrective actions for the spent fuel rack cells have been completed and inadequate cells documented to preclude their use. However, NCR 2394 concerning valve documentation discrepancies has not been closed by the licensee. The licensee's final report dated January 14, 1981, stated all discrepancies had been referred to Westinghouse for concurrence in the disposition and resolution of discrepancies for the valves and that all documentation would be revised to reflect correct data. TVA also stated that the cause of the deficiencies was being investigated to preclude recurrence. The response did define causes but did not list action to preclude recurrence.

This item will remain open.

u. (Open) Deviation (390/82-03-01) Failure to Accomplish FSAR Commitments. The deviation identified that spent fuel pit had not been drained to the CVCS holdup tanks as stated in FSAR section 9.1.3.2 and table 14.2-1. Subsequently the licensee changed table 14.2-1 to reflect that the pit was drained to the RWST; however, the inspector noted that section 9.1.3.2 had not been changed.

This item will remain open.

v. (Open) Open Item (390/82-22-01) Methods Used to Determine Reportability to NRC. The findings identified apparent inadequacies within

the licensee's reporting organization. Specifically methods utilized to ensure that correct source documentation was available to licensing personnel were questionable.

Since the finding was made, several reports submitted by TVA to NRC have been determined to be inadequate, incorrect or in the case of 50.55(e) reports, withdrawn inappropriately. Several discussions have been conducted between Region II management and TVA to address these inadequacies. The SALP evaluation for TVA generally stated that overall, the system for reporting had improved except for timeliness. Discussions were also held with TVA officials on May 25, 1983 in Region II, and NRC again reiterated its concerns with TVA responses.

In following up further on this issue the resident inspector reviewed two reportability packages. These packages were filled out by EN DES licensing personnel after receipt of information from TVA nuclear divisions and, when completed, required reporting or not reporting. After reviewing the two packages that were written in response to two significant nonconformances (NCR) initiated by NUC PR, the inspector agreed with the licensing engineer's evaluation, i.e., the NCRs were not reportable. However, the inspectors also determined that the most effective source documents were not used. Specifically, the licensing engineer utilized the FSAR Table 3.2.2 to categorize items as safety related instead of using the newly generated CSSC (Q) list. The inspector also determined that the licensing group does not utilize formal procedures or check lists to aid in determining reportability. Instead, the group utilizes experience and on-the-job training methods. The inspector will continue to closely monitor the licensee's reports.

This item will remain open pending further review.

w. (Open) IFI (390/82-10-01) Worker Concern on Spent Fuel System Cavitation. The item identified that a worker was concerned about vibration caused by water hammer due to inadequate supports on the Spent Fuel System during testing. Subsequently the licensee evaluated the problem as cavitation instead of vibration from water hammer. The inspector stated that he would evaluate the results of the licensee 79-14 program in and around the system pumps to ensure the adequacy of supports. In June 1983, the inspector reviewed 79-14 package IR78-47W454-200 that contained the results of 50 support inspections. Thirty-three discrepancies were noted and evaluated by 79-14 group management. Management stated that no discrepancies would contribute to excess vibration; however, these discrepancies had not been evaluated by the appropriate designers.

Until the design group reviews the discrepancies and concludes that the discrepancies would not contribute to excess vibration this item remains open.

x. (Open) TMI (80-RD-06) Shift Turnover and Relief Procedures. The inspector reviewed commitments made by the licensee concerning

NUREG-0737 requirements for shift relief and turnover procedures. AI-2.10 described turnover procedures for operators and shift technical advisors. The procedure also defined the mechanisms utilized to ensure critical plant parameters were within specifications. Requirements were specified for ensuring proper system alignment and identification of degraded equipment. The inspector identified three areas of concern:

(1) Technical Specification limits listed in AI-2.10 were different from the most recent draft Technical Specification limits. Not all Technial Specification limits appeared in AI-2.10.

(2) Independent assessment of turnover procedures had not been conducted.

(3) Procedurally, no requirement existed to periodically evaluate the effectiveness of the relief and turnover procedure.

Discussions with the plant superintendent indicated that an independent review would be done prior to licensing (possibly during hot functionals).

This item will remain open.

y. (Open) TMI (80-RD-51) NUREG 0737 Item II.B.1 Reactor Coolant System Vents. The NRC position stated that the licensee shall install Reactor Coolant System (RCS) and reactor vessel head high point vents remotely operated from the control room. Vent system design should not lead to an unacceptable increase in the probability of a LOCA or challenge containment integrity. The system shall be designed as part of the RCS pressure boundary and the system should conform to the requirements of 10 CFR 50 Appendix A. Sufficient redundancy should be provided.

The inspectors performed an as-built verification of the reactor vessel vent system. Approximately fifty percent of the defined measurements were verified in accordance with approved physical drawing 47W465-8. The system contained two manual valves, two solenoid stop valves and two electrically controlled throttle valves. The electrically operated stop and throttle valves were operated from the control room. System configuration was determined to be in accordance with the drawing and the valves were powered from separate safety-related power supplies. A spot check of mechanical snubber integrity was performed and determined to be adequate.

After further investigation, the inspectors determined that a pre-operational test had been developed but the electrically operated valves had failed to operate correctly. Also, procedures had not been developed to ensure proper system operation.

Until preoperational testing is satisfactorily performed and operational procedures are developed and approved, this item will remain open.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. NSRS "Mini-Management" Review

In a letter dated November 5, 1981, (IE report 390, 391/81-14), Region II confirmed that the licensee's Nuclear Safety Review Staff (NSRS) would perform a comprehensive review of their Quality Assurance (QA) Program to determine the underlying causes for deficiencies identified at Watts Bar Nuclear Plant (WBNP) and other nuclear facilities. In a letter dated February 1, 1982, the licensee reported the findings of the NSRS "Mini-Management" Review of the WBNP QA Program. The inspector reviewed the report and the licensee's response and corrective action for the findings. Additionally, the inspector reviewed implementation of corrective action by reviewing selected training records and QA procedures, instructions and test procedures. The inspector discussed corrective action with site personnel including the Supervisor of the Procedures and Training Unit and the site Construction QA Unit and reviewed selected audits performed since the NSRS review. The inspector concluded that the licensee had performed the requested NSRS review at the site and implemented corrective action as described in the February 1, 1982, letter. It should be noted that subsequent inspections are planned (as discussed at a May 25, 1983, enforcement meeting in Region II) at the Watts Bar site and the licensee's Offices of Construction and Engineering Design. The additional inspection will further assess and review the adequacy of the licensee's QA program and the effectiveness of the NSRS review.

6. Followup On Nonroutine Event

a. Potential Common Mode Failure.

During hot functional testing of Unit 1, with the plant at full pressure, temperature and all Reactor Coolant Pump (RCPs) running, an alarm was received for #4 RCP oil level. An Auxiliary Unit Operator (AUO) was sent to the pump and noticed oil issuing from the lower motor bearing. The pump was immediately stopped. Approximately seven minutes later the total Component Cooling Water System (CCS) began to experience pressure surges. Surge tank levels were normal, however pump differential pressure was erratic. The Unit Operator (UO) started filling the surge tanks but later secured filling operations when the tanks overflowed.

Due to erratic CCS operation, all RCPS were stopped. The CCS was vented and a considerable amount of air was noted within the system. Water issuing from the surge tank was noted to be "milky" looking. This indicated that nitrogen was present.

It was later determined that a #4 cold water accumulator instrumentation vent valve had been improperly operated. Subsequently the accumulator was vented to a drain header which also connected to the RCP lube oil cooler (on the CCS side). The nitrogen venting caused gas binding of total CCS system.

The high point vent valve was determined to be a three-way valve. Fully backseating the valve opened a vent path. An operator had previously backseated the valve because it was leaking. Other similar valves in the flow path to th RCP lube oil cooler were found partially open thus allowing a path from #4 accumulator to the CCS system.

Immediate corrective actions included system venting and subsequent restart of RCPs. Operations personnel were indocrinated on high point vent valve operation. An NCR was initiated to assess the adequacy of system design which is field routed and considered non safety-related. Apparently several instrumentation vent lines were tied into the potentially contaminated drain header. This may not have been required since many of the lines are not considered potentially contaminated. After evaluation these lines will be cut and capped. The adequacy of drain header pipe size will also be evaluated. The instrumentation group will continue to develop field drawings for these and other lines (see paragraph 6.c). The resident inspector will continue to monitor licensee corrective actions.

b. Diesel Generator Bearing Failure

During routine surveillance testing of the 2B-B diesel generator, a bearing failed (2B-B engine end of the generator). The failure was identified as wear of the generator shaft insulation material under the inner race of the cylindrical roller bearing. The excessive wear allowed the shaft to drop down and rub the bearing inner and outer oil seals. The insulation wear was caused by the slipping of the inner bearing race. The cause of the slipping could not be readily determined but five contributors were identified:

(1) A small interference between the shaft and bearing cap could have allowed the inner race to begin slipping.

(2) The bearing had previously been overheated. The oil was discolored and contained brass particles. Apparently shaft growth caused a bearing retaining nut to strike an outer oil seal. Shims were installed to provide space for the locking nut and to allow oil flushing. Particulate was reduced but not eliminated.

(3) During bearing disassembly an insulating washer was missing. The washer provides some axial support for the bearing by filling the space between the race and locking nut keeper ring.

(4) Marks on the bearing roller retainer (brass) indicated the bearing locking nut keeper ring had been against the retainer.

(5) The existing bearing locking nut retainer ring tab could slip out of the shaft keyway and turn on the shaft. If this happened, the bearing locking nut could no longer be secured and could turn on the shaft.

Immediate corrective actions consisted of rebuilding the oil seals; polishing the shaft under the seals; replacing the shaft insulation material under the bearing; and installing a new bearing. Recommendations made by NUC PR for EN DES resolution included: 1) Checking for an .004 interference fit as recommended by the manufacturer. 2) Increasing the length of the locking tab of the bearing retainer nut locking ring to keep it in the keyway. 3) EN DES evaluation of the added shims which could have allowed bearing failure.

NUC PR will inspect all generators for insulating washers. For generators with missing washers, the generators will be pulled and washers installed. Monthly oil samples will continue. The resident inspector will continue to monitor corrective actions.

c. During hot functional testing two events occurred which required that the licensee stop testing. The plant was being heated up from ambient temperature to normal operating temp and pressure using RCP and pressurizer heater. During heatup, two pressurizer level transmitters were found to be inoperable. The cause was determined to be mispositioned valves. How the mispositioning occurred could not be readily determined. With plant pressure at 340 psi, 390°F, pressurizer heater on, and RCPs off, part of the surge line and bottom of the pressurizer experienced a 180°F temperature drop within one hour. After investigating the cause, the plant staff determined that the temperature drop occurred due to a small in-surge into the pressurizer caused by increased charging flow for auxiliary spray without simultaneously changing letdown flow. The temperature near the steam/water interface, the RCS temperature and pressurizer pressure did not vary during the transient. Subsequent operation of all RCPs and normal spray caused indicated temperature to return to near 380°F.

The inspector participated in discussions with the plant superintendent and his staff. Investigation revealed that both short and long term corrective actions were needed to preclude recurrence of both incidents.

Concerning pressure transmitter failure, the need for enhanced operations/instrumentation group interface was identified and defined. The need to identify and depict transmitter isolation valves on drawings was discussed. Plans include initiating a set of site drawings and labeling valves. The need for instrumentation operability checks was identified and discussed. This long term corrective action was delegated.

Concerning the temperature transient, immediate training was conducted for operators and STAs. Since a number of control room activities were

in progress at the time of incident, training included operator responsibility and authorities. The staff recognized that preoperational test personnel were unaware of the incident until after the fact. While test personnel had no authority to operate equipment, they should have probably recognized the event at the time. Steps were taken to ensure that test directors were informed and more aware of plant status. The plant staff also intends to address the potential hardware deficiencies. The placement of the temperature detector, auxiliary charging system and its impact on the incident and procedure adequacy, will be addressed. Corporate will review the excessive heat up rate for code acceptability. All completed and proposed corrective actions appeared to be adequate.

7. Preoperational Test Witnessing (Hot Functional Testing)

The inspector made frequent tours of the control room and witnessed various portions of preoperational test - W1.1, Reactor Coolant System Heat Up. The test consisted of heating and pressurizing the plant to normal operating temperature and pressure while stopping at predesignated plateaus to conduct various tests and measure thermal movements of piping. Two significant events occurred during heatup (see paragraphs 6.a and 6.c). The inspector concentrated on reviewing operating groups and management controls during normal operation and during situations requiring corrective actions.

No violations or deviations were identified within the areas inspected.

8. Preoperational Test Results Evaluation (Combustible Gas Control System)

The inspector reviewed preoperational test data for TVA-8, "Post-LOCA Hydrogen Recombiner". The test required preliminary, heat up and air flow measurement testing. The instruction essentially reflected technical manual procedural steps. Defined acceptance criteria was met for both Unit I H_2 recombiners. During the review of FSAR commitments and Section 7 of the test scoping document a misleading statement was identified. Both documents stated the test (preoperational) would prove that each H_2 recombiner unit had the capability of operating at design conditions and that each unit had the capability of operating with a minimum flow of 100 scfm at conditions predicted for the containment atmosphere following a LOCA. In actuality, the preoperational test verified that each unit could achieve 100 scfm; however, testing was not conducted under a predicted post LOCA evironment. LOCA environment testing was conducted by the vendor, Westinghouse, at the factory. The inspector reviewed the Westinghouse test description and found it to be adequate. The licensee will change the FSAR and scoping document to adequately reflect actual activities.

Within the areas inspected no violations or deviations were identified.

9. Dams (Soil Liquefaction Barriers) - Observation of Work Module 45063 C

TVA is required to ecavate soils easterly from the intake pumping station (IPS) and westerly and north from the IPS in areas outlined on the drawings;

and to construct dams (subsurface barriers) with suitable compacted earth. Excavation down to firm shale stratum is required. A shallow layer of #1075 crushed rock will form a friction tie between the shale and the compacted clay dams.

Excavation was started early in July and was approximately 40% complete by July 20, 1983. Backfill and compaction, to 95% of optimum as determined by Proctor Curves developed for the various fill materials selected, was started immediately east of the IPS. The first compaction tests were made and the results were satisfactory.

The inspector has observed the excavation work and inspected the initial backfill and compaction.

No violations or deviations were identified.

10. Dams (Soil Liquefaction Barriers) - Review of Procedures Module 45061 C

In June 1983, the licensee was directed by NRR to install subsurface dams easterly and westerly from the intake pumping station to act as a barrier to transport of soil (liquefied by an earthquake) toward and into the Tennessee River. Soils north from the river toward the 500 KV switchyard and the cooling towers were judged by NRR Soils Specialists to be subject to liquefaction during a seismic event.

The inspector reviewed the work package and the controlling documents: General Construction Specification G-9 R5, "Rolled Earthfill For Dams And Power Plants"; Quality Control Procedure WBNP-QCP - 2.01R4, "Earthfill Placement, Inspection and Documentation; and Drawings 10N 213-1, and -2.

The inspector found that the documents reviewed were adequate.

11. Structural Concrete Building for Fifth Diesel Generator - Module 47053 C - Observation of Work

The inspector inspected forming, placement of reinforcing steel, placement and curing of concrete for the upper walls, parapet and missile shield of the seismic category I structure. Controlling documents are the structural drawings; Quality Control Procedure WBNP-QCP-2.02 R6 - "Concrete Placement and Documentation" and General Construction Procedure G-2, "Plain and Reinforced Concrete."

No violations or deviations were identified.

12. Independent Inspection Effort 92706

The senior construction resident attended the site management conference, Startup Task Force Meeting No. 26, on July 14, 1983. Topics discussed and handout summaries covered equipment and systems transfers, N-5 Program, OWIL, preop testing, status of 50.55(e) items and SER commitments, status of hot functional testing, and status of Bulletin 79-14 work. Besides

gathering scheduling information the resident inspector participated in the meeting by discussing NRC-OIE role in clearance of outstanding items which might impede fuel loading.

13. Followup on Licensee Identified Items

a. (Closed) LII (CDR 390/82-68; CDR 391/82-65) Repacking Valves with Grafoil Packing. The deficiency identified improper installation techniques for Grafoil Packing. Specifically antiextrusion rings may not have been installed as required and contamination could have been introduced into the Reactor Coolant System.

Subsequently the licensee determined this item to be non-reportable in accordance with 50.55(e) requirements based on manufacturer information and industry information. No major problems have been encountered during hot functional testing that relate to valve packing.

This item is closed.

b. (Closed) LII (390/80-27-11; 391/80-21-10) Deficient Kerotest Y-Type Globe Valves. This item was initiated after a violation was issued by Region II that identified numerous deficiencies for Kerotest valves. The valves had been hydrotested at the factory and shipped without replacing the wetted packing. Subsequently the valves corroded internally and, in some cases, extensively damaged valve internal parts. These valves are located throughout both units in safety related systems and several valves perform safety functions (containment isolation and containment spray miniflow).

The corrective action for the deficiency was to open, inspect and replace parts as necessary. Valves were to be reworked after establishing work priorities i.e. safety related valves before non-safety related valves. A memo dated June 24, 1983, concerning the refurbishment program identified the following:

1) The greatest problem encountered had been broken bearings.

2) A metallurgical analysis of a stem/bearing assembly with broken bearings was performed, indicating that the bearings had been subjected to stress corrosion cracking and pitting corrosion.

3) An additional problem created by broken bearings was backseat damage i.e. for valves oriented in the downward direction, the broken bearing pieces sometimes lodged under the backseat, damaging the relatively soft backseat material.

4) Work was approximately 98% completed on Unit 1 and common system valves and approximately 50% complete for designated Unit 2 valves.

5) The memo identified twenty-two different deficiencies mostly related to corrosion.

The inspector reviewed the maintenance documentation and the program for refurbishment and found it to be acceptable.

This item is closed.

c. (Closed) LII (CDR 390/81-21; CDR 391/81-20) Thermon Heat Transfer Cement - NCR WBN CEB 8103. The report identified that heat transfer cement was installed over heat tracing and piping in the area of all supports for process piping containing borated water. The cement was pliable when installed and filled all support and pipe clearances as specified. However when the cement dried it harded and restricted any relative movement between the pipe and support.

To correct this deficiency, typical drawings were revised, design criteria amended and physical changes completed to ensure proper relative movement. The inspector field verified the above corrective actions and found them to be adequately performed.

This item is closed.

d. (Closed) LII (CDR 390/82-114) Control of Non-QA Hex Nuts - WBRD-50-390/82-114 (NCR 4375 R). On October 21, 1982, the licensee reported the issuance of fifty non-QA hex nuts, incorrectly identified as QA material, which could have been used to install supports on the Upper Head Injection system.

In Final Report dated June 28, 1983, the licensee stated that all fifty nuts have been recovered and replaced by nuts that had appropriate QA documentation.

In order to prevent recurrence, Procedure WBNP-QCP-1.06 R12, "Receipt Inspection of Safety-Related Items," was revised to require review of all arriving items by the Materials Services Unit.

Procedure WBNP-QCI-1.06, "Receiving" was issued effective March 11, 1983. This procedure clarifies responsibilities for processing incoming material and instructs crafts to obtain material only from WBN-CONST warehouse. The Materials Services Unit and craft personnel were trained in this procedure effective March 30, 1983. The inspector reviewed substantiating documentation and found it to be acceptable.

This item is closed.

e. (Closed) LII (390/78-17-01) Possible Unconservative Pressure Relief and Safety Line Blowdown Analysis - NCR CWB 78-2. On May 5, 1978, the licensee identified a posssible deficiency in design analysis by EDS Nuclear, Incorporated (EDS), a consulting engineering firm, in that the analysis was made at saturation temperature of 600°F instead of the

defined temperature of 200°F, leading to a possible nonconservative design. EDS reanalyzed the system using RELAP 4/MOD 5 with 200°F water. The indicated nozzle loads on the pressurizer and pressurizer relief tank appeared to exceed the allowable loads defined in Westinghouse specifications. Subsequently, Westinghouse informed TVA that the loads were acceptable. TVA's final report on July 11, 1979, stated that "all support design, review, requalification and new design are completed." On March 10, 1983, the Hanger Engineering Unit certified that all hanger modifications were completed and listed the governing ECN's and work packages.

The inspector reviewed the documentation and discussed the corrective actions with the EN DES hanger unit supervisor on site. All documentation and corrective actions were acceptable

This item is closed for Unit 1 only.

Reference: LII 390/79-30-08 Pressurizer Safety and Relief Line Blowdown Analysis Performed Incorrectly - NCR WBN CEB 79-26; ECN 1474; ECN 3527

f. (Closed) LII (390/79-26-04) Design of Spring Pipe Supports NCR - SWP-79-W-7. On June 5, 1979, TVA notified RII of a potential 50.55(e) item concerning the design of the spring pipe hangers. The designers had not considered the sum of the thermal and safe shutdown earthquake deflections in the design of some spring pipe supports. Spring supports were selected based only on thermal deflections in accordance with ANSI B 31.1 and pipe support vendors' spring selection instructions.

On September 12, 1979, TVA reported that 208 potentially deficient piping supports had been checked to verify correctness of design. Design work for modification of 36 hangers found deficient by this review was completed under ECN 2000 and NCR SWP-79-W-7. Of these, 21 were in Unit 1.

The inspector reviewed the documentation including installation documents, and performed a detailed visual inspection of two spring support assemblies, 03B-1 AFW-V198 and 03B-1 AFW-V199. All corrective actions and documentation were acceptable.

This item is closed for Unit 1.

g. (Closed) LII (390/79-30-08) Pressurizer Safety and Relief Line Blowdown Analysis Performed Incorrectly - NCR CEB 79-26. On July 30, 1979, the licensee identified that EDS Nuclear had discovered an error in the structural dynamics portion of the shock load analysis. The incorrect analysis of the sequential lifting of the safety and relief valves could have resulted in overstressing of piping supports and in-line breaks.

EDS performed a reanalysis which revealed that ten supports had to be redesigned, one support relocated and one support per unit added. Westinghouse approved the increased loading of pressurizer nozzles.

Closure of this item was withheld until the hardware changes initiated by ECN's 1464 and 3527 were completed, scheduled for Unit 1 by fuel loading.

On June 28, 1983, the supervisor of the EN DES site hanger unit certified that corrective work under NCR WBN CEB 79-26, NCR WEB CWB 78-2, OISR-C-7, OISR-C-9 and ECN 1474 were complete for Unit 1.

The inspector reviewed the documentation and held discussions with the HEU supervisor concerning the listing of hangers, work packages and FCRs utilized in the hardware modifications. Redesign and hardware modification processing were acceptable.

This item is closed for Unit 1.

h. (Closed) LIl (CDR 390/82-55; CDR 391/82-52) Deficiencies in Cement Mortar Lining by Ameron - WBRD-50-390/82-55; WBRD-50-391/82-52; NCR's 4117, 4133 R1, 4163 R and 4270 R, Vendor Audit 83V-49.

On May 21, 1982, TVA reported that cement mortar linings applied on the inside diameter of piping in the Essential Raw Cooling Water (ERCW) System was deficient with respect to standards set for slump, temperature, humidity, surface cracks, thickness, end caps and compressive strength. The mortar linings were installed by Ameron Pipeline Division of Kenilworth, New Jersey. NCR 4117 R initiated corrective action. In following interim reports the licensee reported NCRs 4133 R1, 4163 R aand 4270 R identifying additional discrepancies and proposed corrective actions. Line spalling during a seismic event could restrict flow in the lines and heat exchangers and jeopardize safe operation of the plant.

Final Report dated May 20, 1983, indicated that ERCW lining and lining repairs were completed on September 22, 1982. NCRs 4117 R, 4133 R and 4163 R were closed on September 13, 1982.

NCR 4270 R was opened January 13, 1983. It cited certain deficiencies in Ameron documentation and TVA inspection of repairs (not required by the construction specification). It stated that installation and repairs were complete but that TVA should audit Ameron's inspection records and QA program in accordance with Specification 5225, Appendix B, Section 14. Vendor Audit 83V-49 was conducted at Ameron, Pipe Lining Divisions, Wilmington, California, on May 6, 1983. The findings were transmitted to the Chief, Nuclear Engineering Support Branch on May 13, 1983, for determination of reportability under 10 CFR 50.55(e). The evaluation, dated May 19, 1983, determined that no audit deficiency was plant safety significant and therefore not reportable.

NCR 4270 was then closed on July 7, 1983. The interiors of the lines were not accessible for NRC inspection; however, the inspector reviewed the documentation and concluded that the possibility of flow restriction, from lining material spalled during an earthquake, had been diminished.

This item is closed.

i. (Closed) LII (CDR 390/83-04; CDR 391/83-04) Installation of Pipe Support Does Not Allow For Thermal Movement. The report identified that one pipe support was not installed per the design drawing and would not allow for thermal movement of the required 0.4 inches. The deficiency was discovered during the Black and Veatch Independent Design Review.

The licensee initiated a nonconformance report (NCR) and trimmed the support sleeve to allow for adequate thermal movement. Applicable drawings were changed. In order to preclude repetition, all hanger engineering and inspection personnel were retrained in the requirements of final support inspection.

This item is closed.

j. (Closed) LII (CDR 390/82-60; 391/82-57) Potentially Deficient Valve Yoke Hold-down Nut - NCR WBN NEB 8211. Based upon correspondence from Westinghouse concerning generic applicability of deficient valve design, TVA no longer considered the item reportable. Westinghouse stated that they had reviewed the Masoneilan valve problems and concluded that with proper installation and maintenance, no problems should occur.

This item is closed.

k. (Closed) LII (CDR 390/80-04) SIS Train B Flow Deficient - NCR WBN NEB 8004. In a report dated May 1, 1980, TVA identified that the Safety Injection (SI) system train B cold leg injection rate was found to be only 4000 gallons per minute, as compared to the required 4500 to 5000 gallons per minute. The addition of flow restrictors resulted in cavitation at the residual heat removal (RHR) heat exchanger outlet valves. After receiving Westinghouse concurrence the RHR heat exchanger outlet valves were set at 79 degrees open. The setting stopped the cavitation and a flow of 4500-5000 gallons per minute was attained.

The inspector discussed the RHR system testing with the preoperational test engineer and verified that preoperational testing had been performed to verify adequate flow.

This item is closed.

l. (Closed) LII (CDR 50-391/83-25) Incorrectly Wired ERCW Flow Control Valves. NCR 4704. The licensee's report stated that two Unit 2 ERCW valves had been found to be incorrectly wired. The valves had been wired to opposing trains. The deficiency was caused by the close proximity of the valves, misinterpretation of drawings and the fact that the valves were not field identified at the time.

The inspector reviewed the following documentation to ensure that the valves were correctly wired. Work plan 2463 which included torque and limit switch adjustment cards, functional test cards, termination cards for cable pulls and the nonconformance report. Training records were also reviewed. All documentation was acceptable.

This item is closed.

m. (Closed) LII (CDR 390/81-70) Piping Protective Devices - Welding - WBRD-50-390/81-70 (NCR 3523 R3). On August 10, 1981, the licensee reported that corrective actions on welds found deficient under NCR 3001 R would be processed under NCR 3523 R.

This nonconforming condition was identified as part of the disposition of NCR 3001R R1 which dealt with insufficient documentation on installation and fabrication of all pipe whip and jet impingement protective devices. NCR 3523R identified substandard welding throughout all protective devices. The substandard welds exhibited excessive weld buildup, undersized and oversized fillet welds, partial penetrations, and pin holes.

Corrective actions included rework, repair, or "use-as-is" after evaluation.

The inspector reviewed documentation pertaining to NCR 3001R R3 and NCR 3523 R0. Both NCRs were closed on April 20, 1983. Corrective action were determined to be acceptable.

This item is closed.

n. (Closed) LII (CDR 390/81-27) Insufficient Documentation for Protective Devices - WBRD-50-390/81-27 (NCR 3001 R1; NCR 3523 R3). On March 13, 1981, the licensee reported insufficient documentation for the installation and fabrication of all pipe whip and jet impingement protection devices (PDs). These devices provide protection to safety system components from postulated high energy pipe breaks.

For corrective action, TVA reinspected and evaluated all PD's; maintained a log of all Field Change Requests (FCRs) generated for drawing revisions under NCR 3001 R. Weld repairs were made as required and all welds were documented. The location was established and the configuration and clearances were verified for all PD's. Anchor bolts were inspected, tested and documented.

NCR 3523 R was used to evaluate and/or repair and document identified subtandard welds.

By letter entitled Supplemental Information dated May 6, 1983; by Partial Release From Nonconforming Status for NCR 3001 R, R3, dated April 20, 1983; and by Partial Release From Nonconforming Status for NCR 3523 RO dated April 20, 1983, the licensee has asserted that for all Unit 1 protective devices, "Welds reworked or repaired, location and configuration per EN DES drawings, additional FCRs or NCRs implemented to repair structures, have been inspected and their disposition documented."

A separate 50.55(e) report, WBRD-50-390/81-70, was made by TVA on August 10, 1981, for.corrective actions under 3523 R, "Piping Protective Welding". A separate closure for CDR 390/81-70 is given in this report.

The inspector reviewed the documentation including inspection sheets and found it acceptable.

This item is closed.

o. (Closed) LII (CDR 390/82-63; CDR 391/82-60) Spent Fuel Pool Gates - NCR WBN NEB 8005. On June 1, 1982, the licensee identified the need to modify the spent fuel pool gates for seismic Category I stresses as required by USNRC Regulatory Guide 1.13.

Redesign of the gates was implemented through engineering change notice (ECN) 3475. On December 13, 1982, "Detail Design Criteria for Spent Fuel Pool Gates," WB-DC-40-43, was issued imposing seismic, chemical, and radiation resistant materials criteria for the two gates. Drawings 44N 330, 331 and 332 were issued October 25, 1982, and the ECN was closed December 30, 1982.

Modifications to the gates were accomplished under Work Plan 2178 and were certified completed on June 29, 1983.

The inspector reviewed the design criteria, the implementing drawings, the NCR and ECN, and the QC inspectors reports. Discussions on acceptance tests made prior to fuel pool filling were held by the inspector with the responsible assistant construction superintendent and the responsible site engineer. Corrective actions were acceptable.

This item is closed.

p. (Closed) LII (CDR 390/83-30; CDR 391/83-30) Control Room Isolation Dampers Leaking. The inspector reviewed NCR WBN SWP 8323 and its supporting documentation, including ECN 3710 and ECN 2510. The inspector examined the requirements for the Main Control Room Habitability System and Control Room Area Ventilation System as

delineated in sections 6.4 and 9.4.1 of the FSAR and applicable draft Technical Specifications. A drawing review of 47W611-31-2 R6, "Electrical Logic Diagram Ventilation System" and 47W866-4 R24, "Heating Ventilating and Air Conditioning Air Flow," discussions with cognizant engineers and technicians, and field inspections of the completed work revealed no discrepancies between the written NCR and the inspected conditions.

This item is closed.

q. (Closed) LII (CDR 390/81-73; CDR 391/81-69) Diesel Generator Room Exhaust Fan Modification - WBRD-50-390/81-73; WBRD-50-391/81-69 (NCR W-51-P). On August 31, 1981, the licensee reported that all eight fans in the diesel generator room exhaust system exhibited higher than specified vibration amplitudes. Uncorrected, this problem could have led to failure of the exhaust system and overheating of the diesel generator system with possible loss of safety function.

The licensee's final report on June 28, 1983, stated that testing had resulted in the conclusion that the fans were operating at a rotational speed approximating the natural resonant frequency of the fan structures thus amplifying vibration to unacceptable levels.

Fan speeds were increased from 15 percent to 17.5 percent above previous recorded speeds by changing the pitch of the adjustable motor sheave on each fan. The higher speeds dampened vibration to acceptable levels. Flow volumes were measured at the higher speeds and found acceptable. The inspector listened to the operating exhaust system and detected no "hunting" or discordance. Room occupants reported smooth operation since fan speeds were increased. The inspector reviewed the reports and documentation of tests and found them acceptable.

This item is closed.

r. (Closed) LII (CDR 390/80-10; CDR 391/80-10) Revised Pipe Break Locations - NCR WBN CEB 8010. On October 30, 1980, TVA identified a potential problem in that certain TVA design groups were not using EDS Nuclear, Incorporated's latest revisions of break location summaries for the design of pipe rupture protective devices. Because of revised pipe break locations, some protective devices could have been positioned other than in the best locations.

The initiating NCR indicated that corrective action was not applicable "As part of the design process, pipe rupture evaluation of reanalyzed systems is a continual effort and as such there is no specific corrective action". Nevertheless, in closing the NCR, under item 16, the record indicated three corrective actions:

1. To assure better coordination within CEB between the pipe rupture section and the affected piping analysis sections, a CEB coordination form was prepared in the rigorous analysis handbook,

"Analysis Isometric Coordination Procedures," Section No. WBN-RAH-501, to incorporate requirements for coordination including pipe rupture coordination.

2. Included "pipe rupture analysis required" as a check off item on the standard ECN cover sheet indicated in EN DES-EP 4.02 "Engineering Change Notices (ECNs) - Handling."

3. Include pipe rupture coordination on the piping analysis transmittal form used by the design project. This form is now documented in CEB Policy Memorandum, "Transmittal of Piping Analysis Information."

On June 10, 1983, two independent TVA reviewers approved the NCR notations and on June 15, 1983, the Civil Engineering Branch Chief signed the "All Action Complete" block.

To the inspector, it appeared that there had been inadequate coordination between EN DES and the Office of Manager, Nuclear Regulation and Safety resulting in delay in resolution; but the inspector concurred with the licensee's termination of this 50.55(e) concern.

This item is closed.

s. (Closed) LII (CDR 390/82-54) Undocumented Minor Modifications to Structural and Miscellaneous Steel - WBRD-50-390/82-54 (NCR WBN 4093 R). On May 10, 1982, the licensee identified a 50.55(e) concern on minor modifications to structural steel beyond the concerns identified in CDR 390/81-75 for changes to platforms, ladders and stairs. Equipment supports, supplemental framing, building structural steel, etc. had deficiencies in drawing configuration control such as connection details and welds.

The title of the CDR indicated "minor modifications" but NCR 4093 R covered all structural and miscellaneous steel except platforms, ladders and stairs. Some of the actual work involved very large and complex structural elements such as that for the boric acid support framing.

The work under NCR 4093 R for Unit 1 was certified as completed and acceptable on June 30, 1983, for drawing conformance and documentation requirements.

On July 5, 1983, the inspector visually inspected the modifications for four purge air valves and duct supports, boric acid support framing; monorail over the HPCI pump; air intake framing with coil and filter supports; and support for four fans and associated equipment. No problem was identified in inspection of the work and review of documentation.

This item is closed for Unit 1.

t. (Closed) LII (CDR 390/81-93) Thermal Range Incorrectly Analyzed - WBRD-50-390/81-43 (NCR WBN CEB 8116). On October 22, 1981, the licensee identified use of incorrect thermal range by the piping stress analyst to evaluate the moments for suction and discharge piping for the auxiliary feedwater pumps. Errors were discovered during an analysis review. Unconservative stress levels could have resulted from the analysis errors.

In accordance with Watts Bar FSAR, Section 10.4.9.2, TVA reanalyzed the affected piping for the required thermal range of 40° to 120°F.

The reanalysis resulted in issuance of engineering change notice ECN 3210 which implemented appropriate drawing revisions and initiated support modifications based on the new piping loads in both Units 1 and 2. On June 30, 1983, TVA reported that Unit 1 support design changes had been completed. By memorandum dated July 9, 1983, the Hanger Engineering Unit (HEU) coordinator reported "HEU considers all corrective action complete for this 50.55(e) item with respect to known requirements at this time for Unit 1 only."

Modifications were made to 188 supports and restraints in Unit 1. On July 11, 1983, the inspector reviewed documentation and then chose the following items for physical inspection:

Restraint 1-03A-497
Restraint 1-03B-1APW-R15
Beam Hanger Support 1-03B-12

The positioning and configuration of these members was verified to be corrected by the inspector.

This item is closed.

u. (Closed) LII (CDR 390/83-32; CDR 391/83-32) Fire Dampers Improperly Installed and Damaged. The report identified that nine fire dampers were found damaged after installation. In addition, one damper was found purchased/installed for the wrong mounting position.

TVA purchased and installed new dampers and issued Quality Control Instruction (QCI) 1.56 to provide better control of construction work. Procedure adequacy and implementation of the work package program has been reviewed by the inspector on several previous occasions and found to be adequate.

This item is closed.

v. (Closed) LII (390/79-26-07) Electrical Junction Boxes in Containment - NCR EEB 79-8. On June 16, 1979, TVA notified the Region II of a potential 50.55(e) item concerning the electrical junction boxes located in the containment. The unventilated NEMA 4 junction boxes might not withstand the containment pressure following a LOCA. Under

EN DES NCR 79-8, two types of corrective actions were taken. ECN 2136 directed that terminations housed in junction boxes on Class 1E circuits were to be replaced with splices insulated with heat shrinkable sleeving. ECN 2413 provided for changes to eight resistance temperature detectors (RTDs) housed in gasketed junction boxes where terminations are needed to accommodate calibration check points and to facilitate maintenance or replacement. The RTD terminations were coated with a silicone coating. ECN 2136 was closed December 19, 1979 and ECN 2413 was closed June 13, 1980. Field modifications were accomplished for Unit 1 under Work Plan 2782 which was completed on July 1, 1983.

The inspector sampled the completed work by inspecting sealed terminations in junction box 1-JB-293-4348 and sealed splices in junction box 1-JB-293-369-4. At each location, sealing was found to be acceptable.

This item is closed.

w. (Open) LII (CDR 390/81-101; CDR 391/81-95) Control Room Habitability. The inspector reviewed NCR WBN SWP 8101 and its supporting documentation, including ECNs 2510, 2512, 2752, 2753, and 2679. The inspector examined the requirements for the Main Control Room Habitability System and Control Room Area Ventilation System as delineated in sections 6.4 and 9.4.1 of the FSAR and applicable draft Technical Specifications. A drawing review of applicable logic and flow diagrams, discussions with cognizant engineers and other licensee personnel and field inspections of the as-built system revealed discrepancies between the inspected conditions and the Second Revised Final Report to the NRC as follows:

1) The report stated in paragraph 1: "...The ductwork for these systems was replaced with spiral welded pipe." Contrary to this statement, ductwork feeding FCV 31-36 and 31-376 was rectangular ductwork. Other ductwork may also be incorrect and needs licensee evaluation. This item is misstated.

2) Paragraph 2 states: "Tight sealing, manually operated doors were added in the ducts..." The doors were installed, however, missing gasket sections on Unit 2 side may allow leakage. This item needs to be evaluated and corrected if necessary and Unit 1 requires inspection.

3) Paragraph 3 states: "The ducts connecting the smoke removal fan to the battery exhaust system were blanked off..." This item is misstated. The ducts are not blanked off. The fan is isolated from the battery exhaust sytem by flow control valves FCV-31-205 and FCV 31-204B.

4) Paragraph 4 states: "The chlorine detection sample lines were moved from the discharge of the pressurizing fans to a point downstream of the butterfly valves..." This item is misstated.

The chlorine detection sample lines are installed in the common discharge duct of the A and B Air Handling Units, instead of the downstream discharge of the pressurizing fans. The present arrangement would appear to detect chlorine after the control room had been exposed to the gas instead of upon initial introduction.

After discussion with the resident inspector it appeared that the aforementioned ECNs may not have recieved appropriate distribution. It is expected that the licensee will review the matter to ascertain correct routing. These items plus additional inspection in the area of preoperational testing will be reviewed at a later date.

This item remains open.