NUCLEAR PERFORMANCE PLAN
WATTS BAR
VOLUME 4

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Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

Dan A. Nauman
Senior Vice President, Nuclear Power

SEP 06 1991

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

WATTS BAR NUCLEAR PLANT (WBN) - NUCLEAR PERFORMANCE PLAN, VOLUME 4, REVISION 1

The purpose of this letter is to transmit Revision 1 of the Watts Bar Nuclear Performance Plan (WBNPP), the original version of which was submitted to NRC on May 22, 1989. The WBNPP completed TVA's response to the NRC's letter of September 17, 1985, issued pursuant to 10 CFR 50.54(f), by providing information regarding TVA's WBN-specific actions to correct problems in the management of nuclear activities.

As you know, the WBNPP describes the actions taken or planned by TVA to identify, document, investigate, and correct problems at WBN. After reviewing the original WBNPP, the NRC issued Safety Evaluation Report (SER), NUREG-1232, Volume 4, on December 28, 1989, endorsing the general approaches of the various corrective action activities described in the WBNPP. Since the time the original WBNPP was submitted and reviewed, several significant changes in WBN's organizational structure and corresponding functional responsibilities have occurred. In addition, a number of changes in the various corrective action programs have taken place. These changes are intended to increase TVA's ability to effectively close out corrective actions at WBN and provide a greater level of assurance that upon completion of these corrective actions, WBN design and construction will be in accordance with applicable regulatory requirements and TVA commitments.

U.S. Nuclear Regulatory Commission

SEP 06 1991

To facilitate NRC's review, revisions to the original WBNPP text are indicated by revision bars. We suggest that a meeting between our staffs to review the updated portions against the original text of the WBNPP would be helpful. Accordingly, I have asked George L. Pannell, WBN Site Licensing Manager, to call Peter S. Tam of your staff to arrange such a meeting.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D. A. Nauman

Enclosure
cc (Enclosure):

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WATTS BAR NUCLEAR

PERFORMANCE PLAN

Revision 1

TENNESSEE VALLEY AUTHORITY

August 1991

EXECUTIVE SUMMARY

In 1985, in response to various problems identified in the Tennessee Valley Authority (TVA) nuclear program and numerous employee concerns raised with respect to the Watts Bar Nuclear Plant (WBN), TVA shut down all of its operating nuclear units and delayed its pursuit of an operating license for WBN unit 1. Subsequently, the Nuclear Regulatory Commission (NRC) requested in a September 17, 1985 letter issued pursuant to 10 CFR 50.54(f) from the Executive Director for Operations, that TVA furnish plans for addressing issues raised with respect to its overall management and with respect to each of its nuclear plants. Based on these developments, TVA embarked on a long-term effort to review comprehensively its nuclear program and to respond to the NRC. This effort, as it specifically relates to WBN, is described in this document, the Watts Bar Nuclear Performance Plan (WBNPP) (Volume 4).

TVA's efforts began in 1986, with a comprehensive review of its management of the overall nuclear program. This review was aided by a team of senior industry advisors and led to the extensive organization and management changes described in the previously released Corporate Nuclear Performance Plan (CNPP) (Volume 1). TVA's CNPP commitments have been largely completed and the Nuclear Power corporate and plant site organization descriptions are now described in Topical Report TVA-NPOD89-A.

The WBNPP describes the actions taken or planned by TVA to identify, document, investigate, and correct problems at WBN. The WBNPP specifically provides further assurance that upon completion of these actions, WBN will be designed and constructed in accordance with applicable regulatory requirements and TVA commitments. In conjunction with the CNPP, the WBNPP responds to NRC's specific request for information under 10 CFR 50.54(f) as it relates to WBN. TVA notes, however, that the WBNPP does not address all licensing matters that will be required for fuel load and operation of WBN. Those remaining licensing matters have been addressed in previous safety evaluations or will be addressed in accordance with routine NRC licensing practices.

As described in the WBNPP, TVA's efforts at WBN began with the WBN Task Force, comprised of experienced nuclear industry personnel. The WBN Task Force reviewed and evaluated several previously completed discovery programs, including numerous self-examinations conducted by both internal and independent external review groups. Through this evaluation process, problems were categorized and grouped by characteristic and type in order to facilitate the development of effective corrective actions, which became known as Special Programs.

These previous discovery programs, along with the efforts of the WBN Task Force, show that TVA had organizations, programs, and defined processes in

place to control the design and construction of its nuclear power plants. However, weaknesses in some programs were also identified that were not in all cases adequately addressed. These weaknesses related to definition of problem scope, root cause analyses, implementation of corrective actions, and recurrence control. A number of these weaknesses were addressed in the CNPP.

Out of concern for the impact of these weaknesses at WBN, TVA decided to take additional action beyond the corrective actions defined by the WBN Task Force to assure that WBN would comply with associated regulatory requirements and TVA commitments. Accordingly, the Watts Bar Program Team (WBPT) was appointed by the Senior Vice President, Nuclear Power. Members were selected on the basis of their experience and independence from WBN design and construction. The objective of the WBPT was to look beyond the previously identified problems and perform an overall evaluation of plant design and construction in order to identify corrective actions necessary to provide reasonable assurance that WBN meets licensing requirements and TVA commitments.

The WBPT recognized the need to review the entire plant in an integrated, systematic manner. Accordingly, the WBPT developed the Systematic Evaluation to examine individual safety-related structures and components (elements) and those characteristics related to their capability to perform their intended function (attributes). Using this element/attribute approach, the WBPT was able to evaluate previously developed Special Programs, conditions adverse to quality (CAQs), employee concerns, and the Vertical Slice Review (VSR), all of which are described briefly herein and in detail in the WBNPP.

The review of Special Programs conducted by the WBPT resulted in identification of corrective actions of a programmatic nature or of broad scope and required early NRC review and concurrence. These Corrective Action Program (CAP) Plans required approval of TVA upper management. All CAPs were submitted to NRC for review. Individual Safety Evaluation Reports (SERs) or Inspection Reports (IRs) have been issued by the NRC endorsing the approach for addressing the issues identified in each CAP. The Special Programs, as well as the individual CAPs, have been thoroughly reviewed and accepted by the WBPT and form the basis for the majority of actions to be taken to provide additional assurance that WBN complies with licensing requirements and TVA commitments.

A key part of the Systematic Evaluation was the performance of the VSR by an independent contractor. This extensive program was initiated to detect any problems that had not yet been identified through previous discovery programs, while at the same time confirming that the corrective actions planned were adequate to resolve the identified problems. The VSR covered design, construction, and records attributes for two systems, as well as a horizontal cross-section of plant features that were not a part of the systems reviewed. This program, which spanned approximately nine months, was completed in February 1989. The VSR has provided valuable information to the WBN line organizations to enable them to enhance and strengthen the corrective actions described in the CAPs and Special Programs to further assure that they completely and adequately address the problems at WBN.

Another key element of the Systematic Evaluation is the TVA CAQ process. This process, which is an important element of the TVA Nuclear QA Program, had been revised in the CNPP to require the direct involvement of Nuclear Power management in assuring that timely and effective actions are taken to correct problems and prevent their recurrence. The CAQ process was further revised in February 1991 to incorporate lessons learned during implementation. TVA's process for identifying, documenting, and resolving adverse conditions is now entitled, "Corrective Action Program." Many specific issues at WBN have been and currently are being addressed through this process.

The Systematic Evaluation and the resulting corrective actions will provide additional assurance that WBN is designed and constructed in conformance with licensing requirements and TVA commitments. However, TVA views implementation of the various corrective actions as an important step before operating the plant. Accordingly, the WBNPP identifies the overall methods established to assure that the implementation process is carried out in an effective manner.

Specifically, for each of the CAPs and Special Programs, a Project Manager has been assigned as the single point of responsibility for its effective implementation. To further ensure the effective implementation of corrective actions, a site integrated schedule is being prepared to identify activities scheduled to be complete before fuel load. This schedule includes the CAPs and Special Programs.

An integral part of the implementation methodology is the quality verification process. This verification process is carried out by the Site Quality Manager to provide an adequate level of confidence that work has been performed in accordance with requirements. As routine quality assurance functions are implemented, any additional problems or deficiencies that are identified as conditions adverse to quality will be tracked and corrective actions implemented in accordance with the established TVA Nuclear Quality Assurance (NQA) Program. As a final confirmation of the adequacy and implementation of the design, construction, and inspection processes and the adequacy and implementation of corrective action programs, experienced quality assurance personnel will perform an in-depth audit similar to the NRC Integrated Design Inspection (IDI) performed at the Sequoyah Nuclear Plant (SQN).

TVA has also addressed management and organizational issues at WBN. In order to further strengthen management involvement and project control, the Senior Vice President, Nuclear Power established in August and September 1990 the positions of Vice President, Nuclear Projects and Vice President, WBN Site, and in July 1991, the position of Vice President, Completion Assurance. The Vice President, WBN Site, effectively assumed the responsibilities of the WBN Site Director. TVA has established at WBN an organizational structure and management process consistent with the Nuclear Power organization and processes established by the CNPP. For example, the overall WBN organization has been strengthened by reorganization into functional departments that generally parallel the

functional departments in TVA's corporate organization. Site support organizations, such as training, quality assurance, and human resources receive technical direction from their respective corporate organizations. In addition, specific organizations are being strengthened onsite to assure control of operations, maintenance, design and modification activities, and quality assurance. Knowledge of the plant has also been strengthened through additional Senior Reactor Operator and plant systems training for plant engineering supervisors who will be involved with the eventual operation and maintenance of WBN.

Because of past problems attributed to a lack of management involvement in the control of work practices, several actions have also been taken in the areas of goal setting, communication with employees, training, procedures involvement, corrective action programs, and resolution of employee concerns. These measures are described in the WBNPP. Employee concerns expressed at WBN before February 1, 1986, were evaluated and resolved by TVA's Employee Concerns Task Group (ECTG). The evaluation and resolution of these concerns were described in a series of reports which have been submitted to NRC. The conclusions of the ECTG are provided in the WBNPP.

In addition, in order to foster employee trust in TVA's nuclear management and to instill an atmosphere conducive to high-quality work, TVA established the Employee Concern Program (ECP), in which employees were encouraged to express concerns to nuclear management without fear of reprisal, and with assurance that their concerns would be fully addressed. The ECP has been retitled to Concerns Resolution (CR) to better reflect TVA nuclear management's emphasis on analyzing and resolving concerns that are important to safe, reliable plant operation through the normal line organizations.

As the corrective action work at WBN proceeds toward completion, the organizations and management required to operate and maintain the plant will be preparing for operation. Assurance that readiness for operation is achieved will be provided through a planned series of reviews and evaluations by both onsite line organizations and independent offsite organizations. Plans for assuring operational readiness are described in this WBNPP.

After the issuance of the WBNPP, the WBPT monitored its implementation and reported observations directly to TVA's corporate and line managers. In addition, the WBPT reviewed and approved changes to CAPs and Special Programs. The WBPT completed its responsibilities at WBN and issued its final report in May 1991, and its monitoring and verification functions were assumed by WBN line organizations.

The NRC has completed its evaluation of the WBNPP, dated May 22, 1989. SER, NUREG-1232, Volume 4 was transmitted to TVA by letter dated December 28, 1989. The SER documents the bases for the staff's endorsement of the general approaches of various corrective action activities described in the WBNPP.

In summary, TVA has conducted a full and comprehensive discovery program, and through the Systematic Evaluation, has identified corrective actions

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In summary, TVA has conducted a full and comprehensive discovery program, and through the Systematic Evaluation, has identified corrective actions

that, once implemented, will provide substantial additional assurance that WBN is designed and constructed in accordance with regulatory requirements and TVA commitments. TVA has also established the organizational structure and management processes, consistent with the CNPP, to effectively carry out the completion of corrective work and to prepare for power operation.

WATTS BAR UNIT 1 NUCLEAR PERFORMANCE PLAN

VOLUME 4, REVISION 1

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ACRONYMS

ITEM	DESCRIPTION
ABCSM	Adhesive-Backed Cable Support Mounts
ACR	Attribute Coverage Report
AFW	Auxiliary Feedwater
AI	Administrative Instruction
ALARA	As Low as Reasonably Achievable
ANSI	American Nuclear Standards Institute
AOI	Abnormal Operating Instruction
AP	Administrative Procedure
ASER	Accreditation Self Evaluation Report
ASME	American Society of Mechanical Engineers
ASOS	Assistant Shift Operations Supervisor
ASRR	Additional Systematic Record Review
ASTM	American Society of Testing Materials
AUO	Assistant Unit Operator
BIF	Background Information File
BFN	Browns Ferry Nuclear Plant
BFNPP	Browns Ferry Nuclear Performance Plan
BLN	Bellefonte Nuclear Plant
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAQR	Condition Adverse to Quality Report
CAR	Corrective Action Report
CATD	Corrective Action Tracking Document
CCB	Change Control Board
CCRS	Computerized Cable Routing System
CCTS	Corporate Commitment Tracking System
CCW	Condenser Circulating Water
CEB	Civil Engineering Branch
CFR	Code of Federal Regulations
CMTR	Certified Materials Test Report
CNPP	Corporate Nuclear Performance Plan
COTS	Corrected on the Spot
CR	Completion Report
CR	Concerns Resolution
CRS	Concerns Resolution Staff
CSOC	Closed System Outside Containment
CSSC	Critical Safety System Components
DBD	Design Basis Document
DBE	Design Basis Event
DBVP	Design Baseline and Verification Program
DC	Design Criteria
DCIP	Design Change Improvement Program
DCN	Design Change Notice

ACRONYMS (Continued)

ITEM	DESCRIPTION
DCR	Design Change Request
DCRDR	Detailed Control Room Design Review
DD	Drawing Deviation
DEM	Design Engineering Manager
DLMH	Damaged, Loose, or Missing Hardware
DOE	Department of Energy
DPM	Division Procedure Manual
DR	Discrepancy Report
EA	Engineering Assurance
E/A	Elements/Attributes
ECN	Engineering Change Notice
ECP	Employee Concern Program
ECP-SR	Employee Concern Program - Site Representative
ECSP	Employee Concern Special Program
ECTG	Employee Concern Task Group
EEB	Electrical Engineering Branch
EI	Emergency Instruction
EM	Engineering Manager
EN DES	Engineering Design
EPA	Electrical Penetration Assembly
EQ	Environmental Qualification
ER Spec	Engineering Requirements Specification
ERCW	Essential Raw Cooling Water
ESQ	Equipment Seismic Qualification
E&TT	Engineering and Technical Training
FIR	Finding Identification Report
FSAR	Final Safety Analysis Report
GDC	General Design Criteria
GET	General Employee Training
GOI	General Operating Instruction
G Spec	General Construction Specification
HAAUP	Hanger and Analysis Update Program
HRD	Human Resources Development
HVAC	Heating, Ventilating, and Air Conditioning
I&C	Instrumentation and Controls
IE	Inspection and Enforcement
IDI	Integrated Design Inspection
IEEE	Institute of Electrical and Electronics Engineers
IG	Inspector General
IH	Intimidation and Harrassment
II	Incident Investigation

ACRONYMS (Continued)

ITEM	DESCRIPTION
ILS	Integrated Living Schedule
INPO	Institute of Nuclear Power Operation
IR	Inspection Report
IRC	Internal Review Committee
ISEG	Independent Safety Engineering Group
IVP	Integrated Verification Plan
JTG	Joint Test Group
LCC	Lower Compartment Cooler
LDCM	Licensing Document Commitment Matrix
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
M&TE	Measuring and Test Equipment
MAC	Management Analysis Company
MAI	Modification and Addition Instructions
MELB	Moderate Energy Line Break
MEQ	Mechanical Equipment Qualification
M/F	Modifications and Facilities
MFE	Managing for Excellence
MFL	Master Fuse List
MI	Maintenance Instruction
MIC	Microbiologically Induced Corrosion
MSLB	Main Steamline Break
M Spec	Master Specification
MWe	Megawatt (electrical)
MWt	Megawatt (thermal)
NA & S	Nuclear Assurance and Services
NC	Nuclear Construction (WBN)
NCR	Nonconforming Condition Report
NDE	Nondestructive Examination
NE	Nuclear Engineering
NEC	National Electric Code
NEP	Nuclear Engineering Procedures
NERP	Nuclear Experience Review Program
NHR	Nuclear Human Resources
NLRA	Nuclear Licensing And Regulatory Affairs
NMRG	Nuclear Managers Review Group
NP	Nuclear Power
NPP	Nuclear Performance Plan
NQA	Nuclear Quality Assurance
NQAM	Nuclear Quality Assurance Manual
NRC	Nuclear Regulatory Commission
N Spec	Nuclear Construction Specification
NSRB	Nuclear Safety Review Board

ACRONYMS (Continued)

ITEM	DESCRIPTION
NSRS	Nuclear Safety Review Staff
NT	Nuclear Training
NTOL	Near Term Operating License
NUMARC	Nuclear Management and Resources Committee
OBE	Operating Basis Earthquake
OE	Office of Engineering
OEDC	Office of Engineering Design and Construction
OGC	Office of the General Counsel
OI	Operating Instruction
OIE	Office of Inspection and Enforcement
OIG	Office of Inspector General
ONP	Office of Nuclear Power
OQA	Office of Quality Assurance
OR	Observation Report
ORR	Operational Readiness Review
OTNS	Orientation to Nuclear Supervision
PAC/AQ	Program for Assurance of Completion and Assurance of Quality
PAM	Postaccident Monitor
PDA	Preliminary Design Assessment
PE	Project Engineer
PER	Problem Evaluation Report
PIR	Problem Identification Report
PMP	Plant Modification Package
P & OM	Policy and Organization Manual
PORC	Plant Operations Review Committee
PORS	Plant Operations Review Staff
POTC	Power Operations Training Center
PPL	Preliminary Projects List
PRD	Problem Reporting Document
PSAR	Preliminary Safety Analysis Report
PTI	Preoperational Test Instruction
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Procedure
QTC	Quality Technology Corporation
RCS	Reactor Coolant System
RIMS	Records and Information Management System
RIP	Replacement Items Program
RIR	Radiological Incident Reporting
RMS	Radiation Monitoring System

ACRONYMS (Continued)

ITEM	DESCRIPTION
RO	Reactor Operator
RR	Resolution Report
RRT	Records Response Team
SALP	Systematic Assessment of Licensee Performance
SCAR	Significant Corrective Action Report
SCR	Significant Condition Report
SD	System Description
SDC	Supervisor Development Course
SER	Safety Evaluation Report
SI	Surveillance Instruction
SIP	Specification Improvement Program
SIS	Site Integrated Schedule
SOI	System Operating Instruction
SOS	Shift Operations Supervisor
SPOC	System Pre-Operability Checklist
SP & SM	Site Programs and Support Manager
SQN	Sequoyah Nuclear Plant
SR	Surveillance Requirement
SRO	Senior Reactor Operator
SRP	Senior Review Panel
SSE	Safe Shutdown Earthquake
SSER	Supplemental Safety Evaluation Report
STA	Shift Technical Advisor
STD	Standard
SWBP	Sidewall Bearing Pressure
TACF	Temporary Alteration Control Form
TB&A	Theodore Barry and Associates
TI	Technical Instruction
TMI	Three Mile Island
TQM	Total Quality Management
TROI	Tracking and Reporting of Open Items
TS&TSM	Technical Staff and Technical Staff Manager
TVA	Tennessee Valley Authority
UE&C	United Engineers and Constructors
VSR	Vertical Slice Review
VSRT	Vertical Slice Review Team
WBECSP	Watts Bar Employee Concern Special Program
WBEP	Watts Bar Engineering Project
WBN	Watts Bar Nuclear Plant
WBNPP	Watts Bar Nuclear Performance Plan
WBPP	Watts Bar Program Plan
WBPT	Watts Bar Program Team
WBTC	Watts Bar Training Center

ACRONYMS (Continued)

ITEM	DESCRIPTION
WBTD	Watts Bar Training Department
WEP	Weld Evaluation Project
WOG	Westinghouse Owners Group
WP	Welding Project
WR/WO	Work Request/Work Order

I. INTRODUCTION

1.0 PURPOSE

In response to problems that had developed in its nuclear program, the Tennessee Valley Authority (TVA) voluntarily shut down all of its operating units in 1985. Because of these problems and numerous employee concerns raising safety issues at Watts Bar Nuclear Plant (WBN), TVA delayed its pursuit of an operating license for WBN unit 1.

On September 17, 1985, in a letter from William J. Dircks, Executive Director for Operations, Nuclear Regulatory Commission (NRC), to Charles Dean, Chairman, Board of Directors, TVA, NRC provided its Systematic Assessment of Licensee Performance (SALP) and requested specific information pursuant to 10 CFR 50.54(f) (Ref. 1). This letter requested TVA to furnish its plans for addressing issues raised with respect to its overall management and with respect to each of its nuclear plants.

Since receipt of the NRC request for information, TVA has significantly restructured its nuclear organization and management, established improvement programs, and defined systematic approaches for identifying and correcting problems, including those at WBN.

The Corporate Nuclear Performance Plan (CNPP) (Ref. 2), which has been approved by the NRC, describes the measures that have been taken by TVA to improve its nuclear program at the corporate level. TVA's CNPP commitments have been largely completed and the Nuclear Power corporate and plant site organization descriptions are now provided in Topical Report TVA-NPOD89-A (Ref. 3). By letter dated June 26, 1991 (Ref. 4), NRC concluded that it was acceptable to reference this topical report with respect to the organization and staffing for the operation of WBN. This Watts Bar Nuclear Performance Plan (WBNPP), in combination with the CNPP, describes the plan for providing additional management controls and performing specific actions to identify, document, investigate, and correct problems at WBN. This plan responds to NRC's specific request for information under 10 CFR 50.54(f), and presents an integrated plan for further assuring the adequacy of design and construction of the plant. An important aspect of the WBNPP is the performance of a systematic evaluation of plant design and construction in order to identify the corrective actions to provide reasonable assurance that WBN meets licensing requirements and TVA commitments.

Although many of the programs associated with unit 1 are applicable to unit 2, this volume is specifically directed toward unit 1 and common facilities. It will be necessary to conduct an evaluation of results and conclusions drawn from the programs described in this volume at a later time to determine their applicability to unit 2.

The CNPP and the WBNPP provide an account of the actions TVA is taking to improve its nuclear program for WBN. The WBNPP describes the actions

taken and corrective actions planned to demonstrate that the plant has been designed and constructed in accordance with applicable regulatory requirements and TVA commitments. TVA notes, however, that the WBNPP does not address all licensing matters that will be required for fuel load and operation of WBN. Those remaining licensing matters have been addressed in previous safety evaluations or will be addressed in accordance with routine NRC licensing practices. Activities normally required to obtain an operating license will be conducted using established plans and procedures. Upon reaching the fuel load milestone, the WBNPP will have accomplished its purpose and will therefore no longer be necessary. This revised WBNPP describes several significant changes in WBN's organizational structure and corresponding functional responsibilities, and a number of changes in the various corrective action programs that have taken place.

2.0 BACKGROUND

WBN is a two-unit nuclear power plant located approximately 50 miles northeast of Chattanooga, Tennessee. The nuclear steam supply system for each unit is a four-loop pressurized water reactor rated at 3411-MWt furnished by Westinghouse Electric Corporation. Each unit is rated at 1160-MWe. The plant was designed, is being built, and will be operated by TVA. Construction of unit 1 and common facilities is essentially complete except for the corrective action plans described in this WBNPP. Unit 2 construction is approximately 70 percent complete, and is currently in layup. As unit 1 approaches fuel load, unit 2 will commence completion of construction and implementation of corrective actions as appropriate.

In early 1985 WBN was in the final stages of review before obtaining an operating license. The NRC had already issued a Safety Evaluation Report (SER) (Ref. 5) and four supplemental SERs (Refs. 6 through 9).

In April 1985, TVA and NRC became aware of numerous TVA employee concerns that related to WBN's readiness to receive an operating license. Several of these concerns were addressed directly to NRC. After consultation with the NRC, TVA took a number of major actions, including shutting down all operating units. In addition, TVA established a special program for collecting and resolving employee concerns, particularly those from employees associated with WBN.

On September 17, 1985, NRC requested under 10 CFR 50.54(f) that TVA submit its plan to correct programmatic and management deficiencies throughout the TVA Nuclear Program, as well as deficiencies specific to WBN, before licensing of WBN unit 1 (Ref. 1).

In January 1986, the Board of Directors appointed a new Manager of Nuclear Power to oversee all aspects of TVA's nuclear power program. As discussed in the CNPP, a comprehensive review of the nuclear program was initiated to identify problems, causes of problems, and actions required to correct them. The root causes of the problems in TVA's program were

determined by a team of senior experienced industry advisors. Their work was supported by a study performed by a contractor, entitled "Systematic Analysis of Identified Issues/Concerns at TVA" (Ref. 10). This study accumulated issues and concerns from sources external to TVA, encoded these concerns into a data base, analyzed the resultant information, and supported the preparation of the CNPP.

A special WBN Task Force, consisting of senior personnel experienced in nuclear design and construction, was established on March 19, 1986, to identify specific plant problems and develop resolutions before fuel load of WBN. This Task Force examined the WBN-related issues to confirm that the actions taken at WBN suitably addressed the problems identified.

The WBN Task Force developed a list of corrective actions (except for those of a routine nature) to be completed before fuel load. These corrective actions addressed similar or related problems and became known as Special Programs. These corrective actions were compiled from issues previously identified by NRC, the Institute of Nuclear Power Operation (INPO), outside contractor recommendations, and various corporate and site quality assurance related processes. The WBN Task Force established criteria for evaluating the issues and worked closely with WBN line managers in developing resolutions to the known problems. It provided an overview of site activities and information to the Site Director and the Manager of Nuclear Power regarding these and other potential problems.

The WBN Task Force initiative was the first action taken to consolidate issues and develop corrective actions to address similar issues collectively through an integrated plan. The following section describes TVA's actions to perform an overall evaluation of plant design and construction to provide reasonable assurance that corrective actions are established to meet licensing requirements and TVA commitments.

3.0 OUTLINE OF TVA'S APPROACH TO CORRECTING WBN'S PROBLEMS

Previous evaluations by TVA, as well as by outside contractors and regulatory and audit agencies such as NRC and INPO, show that before January 1986, TVA had organizations, programs, processes, and procedures in place to control the design and construction of its nuclear power plants. A collective evaluation of these programs also shows that there were weaknesses identified in some of TVA's programs that were not in all cases adequately addressed. In some cases TVA did not adequately scope weaknesses, did not adequately identify root causes, did not adequately implement the identified corrective actions, or did not provide adequate recurrence control.

The root cause identification and corrective actions taken to address these weaknesses at the corporate level since 1986 are described in the CNPP. In summary, the actions include: hiring experienced nuclear managers; developing and training TVA managers; restructuring the nuclear organization to clarify lines of authority and responsibility and to provide centralized direction and control of nuclear activities; taking

steps to restore employee trust in nuclear management; increasing upper management awareness of and involvement in nuclear activities; and improving the management systems and controls, the corrective action program, and other programmatic areas of operation, maintenance, design change, plant modification, and quality assurance.

The study of root causes and corrective actions was also carried from the corporate level to the WBN project. Corrective action initiatives taken at the corporate level are being implemented at WBN through the WBN Site Vice President, as well as through offsite organizations responsible for direct support to WBN. These improvements include organizational changes compatible with corporate-level restructuring, improved management control and involvement, revised conduct of operations and maintenance activities, improved quality awareness, centralized design control, a long-term program for upgrading procedures, and programs to restore employee confidence. The efforts to standardize organizations, programs, and procedures at the corporate and all site offices are designed to improve communication between sites and apply improvements made at one site to all sites in a timely manner. These efforts also have the additional benefit of improving the exchange of information between NRC and TVA.

In addition to these improvements, many external reviews have been performed to evaluate the adequacy of the TVA Quality Assurance (QA) program and TVA has made a number of program improvements as a result of these reviews. TVA's expanded program for resolving employee concerns also provides added assurance that significant plant deficiencies have been identified and appropriate corrective actions undertaken.

In addition to the significant improvements made in the TVA and WBN organizations and management through the implementation of the CNPP, many Special Programs were developed, which in some cases, have already been implemented to resolve known nonconforming issues. However, because previously completed discovery programs found instances of inadequate root cause determinations and recurrence control for identified weaknesses, questions arose about the degree to which the design and construction of WBN met regulatory requirements. In addition, questions arose about the adequacy of the records documenting the acceptability of nonconforming design, construction and installation for WBN. As a result, the Senior Vice President of Nuclear Power established an independent Watts Bar Program Team (WBPT) to perform an integrated systematic evaluation (Systematic Evaluation) of WBN. This required a more comprehensive evaluation of WBN than had been performed previously. The objective of the WBPT was to look beyond the known problems and perform an overall evaluation of plant design and construction in order to identify the necessary corrective actions to provide reasonable assurance that WBN meets licensing requirements and TVA commitments.

As its first activity, the WBPT developed the Watts Bar Program Plan (WBPP) (Ref. 11), which outlined its overall strategy for evaluating WBN and described the Systematic Evaluation as the means for meeting its

objective. The WBPP was endorsed by NRC in its June 27, 1988 letter to TVA (Ref. 12).

A key part of the Systematic Evaluation was the performance of a Vertical Slice Review (VSR) by an independent contractor. This review served both a discovery and a confirmatory role in TVA's evaluation strategy. Its purpose was to detect problems that had not yet been identified through previous discovery programs, while at the same time confirming that the corrective actions planned were adequate to resolve the identified problems. By selecting two representative systems and extensively verifying the adequacy of design and construction of these systems, overall conclusions can and have been made by the independent review as to the overall adequacy of WBN design and construction.

The WBPT was responsible for developing this WBNPP and recommending the Corrective Action Program (CAP) plans (Refs. 13 through 31) and Special Programs to TVA upper management for approval. The analytical approach used by the WBPT is described in Chapter II. The associated CAPs and Special Programs are addressed in Chapter III.

As a final confirmation of the adequacy and implementation of the design, construction, and inspection processes and the adequacy and implementation of corrective action programs, the Site Quality Manager will perform an in-depth technical audit at WBN. The audit will be managed by an organization separate from the WBN line organization and will be performed by a team composed of experienced technical personnel. The audit will be similar to the NRC Integrated Design Inspection (IDI) performed at the Sequoyah Nuclear Plant (SQN), but expanded to include additional construction, installation, inspection, operations, and maintenance areas. The audit will be conducted approximately six months before fuel load and at or near completion of CAPs and Special Programs. The audit scope will include a safety system, support systems, and portions of other systems and structures as necessary to obtain adequate coverage. An audit plan will be prepared well in advance of the audit to define, in detail, the audit scope, its approach, and the criteria for selection of systems and structures. The audit plan and report will be provided to the NRC.

In following the course of action outlined in the CNPP and this WBNPP, the WBN project will benefit from prior TVA experiences in implementing programs and corrective action plans that have been proven effective and have led to the successful restart of SQN units 1 and 2 and Browns Ferry Nuclear Plant (BFN) unit 2.

4.0 NRC SAFETY EVALUATION REPORT

The NRC has completed its evaluation of the WBNPP, dated May 22, 1989 (Ref. 32). Safety Evaluation Report (SER), NUREG-1232, Volume 4 was transmitted to TVA by letter dated December 28, 1989 (Ref. 33). The SER documents the bases for the staff's endorsement of the general approaches of various corrective action activities described in the WBNPP. This endorsement is limited to the approach and general methods, which if

adequately developed into corrective action programs and implemented thoroughly, should address the identified deficiencies. The staff will review the individual action programs and inspect their implementation in the future. Several sections of the SER contain the staff's evaluation of programs, as described in the WBNPP, that may be revised. The staff will continue to review and monitor these programs and will issue a revised evaluation in a future supplement to the licensing SER (NUREG-0847, Ref. 5) as necessary. The changes included in this revised WBNPP are intended to increase TVA's ability to close out corrective actions effectively at WBN and provide a greater level of assurance that upon completion of these corrective actions, WBN design and construction will be in accordance with applicable regulatory requirements and TVA commitments.

5.0 PLAN ARRANGEMENT

The WBNPP describes programs that identify and correct problems and defines the organizational and management methods for implementing them to ensure operational readiness. It provides information needed by NRC to plan and conduct its audits of the programs. While detailed descriptions of processes are included, technical details are omitted unless they are necessary to describe programs. Documents (procedures, program plans, etc.) are referenced within the sections of the text where applicable.

This WBNPP is comprised of seven major chapters:

- Chapter I reviews the purpose of the WBNPP, provides background information, discusses the approach taken to identify, evaluate, and resolve issues at WBN, and describes its arrangement. Chapter I provides the background for many of the actions taken to correct past problems described in this WBNPP.

- Chapter II describes the past and current processes used to assess WBN design and construction adequacy. This chapter discusses issue discovery, including the WBN Task Force, Concerns Resolution (CR), independent reviews, the Conditions Adverse to Quality (CAQ) Program, NRC audits, and generic industry issues. This chapter also discusses issues previously identified and consolidated to form the basis of the CAPs and Special Programs.

  Chapter II also addresses (1) the WBPT's purpose, objectives, and methodology; (2) the Systematic Evaluation process and methodology; (3) the results of the VSR; and (4) conclusions from the overall WBN assessment of design and construction.

- Chapter III summarizes the CAPs and Special Programs designed to resolve specific issues prior to licensing.

- Chapter IV discusses the implementation of corrective actions and closure of issues as related to the CAPs, Special Programs, the VSR results, and other corrective actions.

- Chapter V describes the program for improving the overall conduct of operations to achieve and maintain a high performance standard at WBN. The WBN organization has been structured to be consistent with the overall Nuclear Power organization to provide for effective management of its activities. This chapter describes the restructuring of WBN organizations and programs necessary to support completion of the project and operation of the plant.

  The discussion of organizational improvements includes steps that have been taken to strengthen functional support, specific organizational and management improvements that have been made, areas of responsibility, accountability, and authority that have been redefined or clarified, and the increased understanding of systems operations by WBN line management.

  The discussion of programmatic improvements includes enhanced management control and involvement through clearer definition of goals and objectives, improved communication with employees, improved training, closer adherence to correct procedures, effective corrective action, improved quality assurance, continued implementation of the employee concern corrective actions, and an improved design change control process.

  Chapter V also discusses lessons learned from SQN and BFN and improvements made as a result, including the assignment of experienced SQN and BFN personnel to WBN.

- Chapter VI describes the Operational Readiness Program to be conducted at WBN before fuel load and power ascension. In addition to each of the programs described herein, a readiness review of plant activities, procedures, and programs will be performed to ensure that appropriate requirements and industry standard practices are being satisfied before fuel load and that operational prerequisites have been met. It is not the intent of this WBNPP to address all licensing matters that will be required for fuel load. However, a summary description of the Operational Readiness Program is provided because this effort will provide additional assurance that WBN is prepared to load fuel and that required commitments have been met.

- Chapter VII previously provided integrated project milestones for major corrective actions. The information formerly provided in this chapter has been deleted in light of the ongoing monthly schedule reviews between TVA and NRC at WBN.

- Appendix A provides information in response to NRC's concerns stated in the 10 CFR 50.54(f) September 17, 1985 letter (Ref. 1).

- Appendix B provides a summary description of results of independent reviews conducted before 1986 and associated corrective actions.

- Appendix C discusses the 11 Nuclear Safety Review Staff (NSRS) perceptions and identifies where each is addressed in this WBNPP.

- Appendix D gives the status of TVA licensing commitments from the CNPP that apply to WBN.
- Appendix E provides the licensing commitments from this WBNPP.

II. WATTS BAR ASSESSMENT

1.0 INTRODUCTION

Throughout the design and construction of WBN, TVA had organizations, programs, processes, and procedures in place to control its design and construction activities. During this period, TVA performed numerous self-examinations, conducted by both internal and independent external review groups. A collective evaluation of these reviews shows that there were weaknesses identified in some of TVA's programs that were not in all cases adequately addressed. In some cases TVA did not adequately scope weaknesses, did not adequately identify root causes, did not adequately implement the identified corrective actions, or did not provide adequate recurrence control.

To address these problems, TVA initiated a vigorous recovery program in 1986. The CNPP was developed to respond to these problems by capturing the programmatic and organizational issues, determining root causes, implementing corrective actions, and establishing recurrence control at the corporate level. At WBN, a Task Force was established to review the implementation of the CNPP, to review the identified issues, and work with the line organization to develop the required corrective actions to resolve those issues.

The WBN Task Force effort resulted in the development of a number of Special Programs involving significant corrective actions. However, toward the end of 1987, it was recognized that the issue discovery process at WBN may not have identified all nonconforming issues. This recognition was based on the fact that various reviews, audits, and employee concerns looked only at portions of the WBN design and construction. The issues identified were related to those parts that were reviewed; however, no comprehensive evaluation of overall WBN design and construction was performed to identify nonconforming issues. Therefore, the WBPT was established to perform an integrated, Systematic Evaluation of WBN and to make recommendations regarding the adequacy of WBN design and construction.

This chapter describes the past and current processes used for the assessment of WBN adequacy including the independent reviews, CAQs, NRC audits, employee concerns, generic industry issues, and the WBN Task Force activities. This issue discovery process is described in Section 2. Section 3 describes the process of issue integration and consolidation in the CAPs and Special Programs. The objectives of the WBPT and the approach used to meet those objectives are discussed in Section 4. Details of the WBPT Systematic Evaluation are presented in Section 5. The VSR, a principal program used in the Systematic Evaluation, is detailed in Section 6. Conclusions from the Watts Bar Program Team Assessment are given in Section 7.

2.0 ISSUE DISCOVERY

Several methods, which are described in the following subsections, have been used at WBN to identify nonconforming issues. These methods include a number of independent reviews performed in the past, the CAQ process, employee concerns, NRC audits, and consideration of generic industry issues identified through NRC generic letters, bulletins, information notices, and INPO reports. This section also describes the effort of the WBN Task Force, which was the initial attempt to integrate the known issues and develop programmatic corrective actions.

2.1 Independent Reviews

During the design and construction of WBN, the TVA program in general, and the WBN program in particular, were independently assessed by a number of organizations. During the 1970s when the TVA nuclear plants were in the design and construction phase, these reviews were conducted primarily by consultants hired by TVA to examine the adequacy of programs within the engineering and construction organizations. These included reviews by the management consultant firm, Theodore Barry and Associates (TB&A) and by the architect/engineering firm, United Engineers and Constructors (UE&C).

With the expanded industry emphasis on safety and quality after the accident at Three Mile Island (TMI), additional independent reviews were performed after 1980. This increased review activity included programmatic reviews by NSRS, the NRC Region II, and INPO. The reviews by NSRS and INPO included examination of the activities of the line organizations and the auditing activities performed by the QA organization. During the 1980s, the NSRS specifically examined the QA program and organizations on two occasions. TVA also retained Management Analysis Company (MAC) in 1984 to examine its QA program. In addition to broad programmatic reviews by such groups, WBN also benefited from specific reviews of selected program elements, as in the cases of Duke Power Company's review of the TVA piping and pipe support program in 1984, and the more extensive independent review of the design and construction of the WBN auxiliary feedwater system conducted by Black & Veatch from 1982 through 1984.

Four independent reviews were conducted within TVA during 1985, including one by INPO of the construction program at WBN unit 2, and two by NRC Region II pertaining to TVA's QA program activities, in particular, the changes brought about by the reorganization of line and QA organizations. A fourth by WESTEC Services involved review of environmental qualification (EQ) activities to determine the degree of compliance with 10 CFR 50.49.

In 1985 and 1986, a series of design control surveys of TVA operating plants was conducted by the Office of Engineering (OE), which used independent teams to assess the design control process; and in 1987, NRC performed an IDI of SQN.

The scope of the above reviews, their significant findings, and the corrective actions taken at the time of the reviews are described in Appendix B to this WBNPP.

As part of the Systematic Evaluation, the WBPT has reviewed the findings resulting from these independent reviews and concluded that the completed or currently planned corrective actions have adequately addressed the findings.

2.2 Adverse Conditions

Adverse conditions have been identified by various names within TVA since the initiation of the WBN Project. Although the names have changed, they had the same purpose: to identify and correct problems and deficiencies in accordance with 10 CFR 50, Appendix B.

Before 1987, TVA used various reports to document and disposition adverse conditions. These reports included, but were not limited to Nonconforming Condition Reports (NCRs), Significant Condition Reports (SCRs), Problem Identification Reports (PIRs), Deficiency Reports (DRs), Corrective Action Reports (CARs), and Audit Deficiency Reports.

In 1987, the Condition Adverse to Quality Report (CAQR) was developed as part of a corporate process to document and disposition adverse conditions. This process was established as part of the corporate corrective action program developed as a result of the implementation of the CNPP. The corrective action process has undergone several modifications but has retained its central purpose of identifying and classifying problems and tracking their resolution to completion. In 1991, the program was modified to provide more complete and consistent evaluation and tracking of identified adverse conditions. This program is entitled, "Corrective Action Program."

In 1987, a decision was made to use the Tracking and Reporting of Open Items (TROI) system as a single system to track CAQRs. This process has been enhanced and continues to function with the current corrective action process. This entire system continues to be upgraded as new developments are made to enhance the overall TVA nuclear QA program.

The issues identified in the CAQRs were bounded along with similar issues identified by the Employee Concern Special Program (ECSP), NRC audits, etc., to develop CAPs and Special Programs, as discussed in Chapter III.

2.3 NRC Audits

Many issues were identified by NRC reviews and audits at WBN. NRC findings, violations, inspection followup items, etc., documented in NRC inspection reports have been included as part of the issue

discovery process at WBN. Open NRC findings are tracked on the TROI system and are resolved with NRC through the normal plant completion and licensing process.

2.4 Concerns Resolution

2.4.1 Background

In April 1985, while TVA was making preparations to obtain an operating license for WBN, the NRC notified TVA that some TVA employees had raised a number of safety concerns, particularly related to WBN, in correspondence to NRC and to congressional staffs. Among those concerns were the employees' fear of reprisal by TVA management for expressing their views about alleged safety problems within TVA. The NRC indicated to TVA that a communications problem existed between management and employees at WBN regarding safety concerns. Further, in NRC's view, the potential existed that nuclear safety problems could be repressed as a result of employees' fear of reprisal from TVA management.

After discussing these issues with NRC, TVA initiated major programmatic actions. One of these actions was to establish a special program for collecting and resolving employee concerns, particularly those from employees associated with WBN. To ensure that employees felt free to express their concerns without fear of reprisal, TVA selected an independent contractor to interview employees then assigned to WBN as well as some former employees.

By January 1986, the interview phase of the special program for resolving concerns at WBN had been completed and investigations had begun. Approximately one-third of the more than 5800 employees interviewed had expressed one or more concerns, resulting in approximately 5000 individual employee concerns to be evaluated. Each concern was a documented description of one or more conditions or circumstances that the employee thought was unsafe, unjust, inefficient, or incorrect. Although TVA had extended the program through the use of mailers and a toll-free telephone number to solicit views from employees at all Nuclear Power locations, the majority of concerns were the product of interviews with WBN employees.

Because of the large backlog of concerns accumulated from the interview process, TVA decided to implement a new process for resolving concerns, and established the ECSP with an implementing task group. The Employee Concern Task Group (ECTG), was charged to evaluate and report on all concerns expressed before February 1, 1986. Also, a new ongoing ECP was established to process all concerns expressed by employees throughout Nuclear Power on or after February 1, 1986. The ECSP program for resolution of concerns and the

ECP effort was described to members of the NRC staff at various meetings and in the TVA transmittal to NRC on May 2, 1986 (Ref. 34). Additional details of the program description were transmitted to NRC on August 29, 1986 (Ref. 35). The NRC staff reported the results of their Safety Evaluation on the ECSP on October 6, 1987 (Ref. 36). In this report, the NRC staff concluded that the ECSP program "is an acceptable program for evaluating and providing corrective actions to the employee concerns addressed by the program."

As the ECTG's comprehensive approach to problem resolution intensified, its scope was expanded to resolve additional concerns and items gathered from sources other than the employees interviewed at Watts Bar. Consequently, in April 1986, the ECTG scope of activity was expanded to include:

- Concerns generated by earlier employee concern programs.
- Additional concerns identified by NRC from the interview files of the independent contractor that had conducted the interviews.
- Additional items identified by ECTG evaluators.
- Concerns received by NRC before February 1, 1986 and referred to TVA.
- Concerns identified by TVA's former NSRS.
- Open items identified from reviews of TVA incoming correspondence from sources such as NRC, INPO, and the U.S. Congress.

The expanded scope of the ECSP increased the total number of concerns to approximately 6000 and involved evaluations at all TVA sites because of the generic applicability of some concerns beyond the site of origin.

2.4.2 ECSP Results

Employee concerns that were evaluated by the ECSP were grouped into nine categories for evaluation, determination of generic applicability, and resolution. In order to facilitate the evaluation of the concerns, they were further broken down into subcategories. The evaluation of the concerns resulted in the issuance to NRC of a summary report, nine category reports, and 107 subcategory reports. These reports contain the summary of issues, findings, causes of the problems, and corrective actions taken or to be

taken. Also, the reports are available to current and former nuclear employees.

Detailed corrective actions were developed for concerns that were substantiated. These corrective actions were reviewed and concurrence was given by the ECSP. An independent review of these activities by outside experts was performed. Each identified corrective action is tracked to completion and verified.

The evaluation of the approximately 6000 employee concerns within the ECSP's scope confirmed that TVA's nuclear program before February 1986 did have some management and organizational inadequacies, some general weaknesses in implementing various programs and processes, and some technical problems. The majority of these weaknesses fell within the bounds of the corrective actions described in the CNPP.

Over three-fourths of the nearly 6000 employee concerns evaluated were not substantiated, were not problems requiring action, or were already being addressed by line management prior to the evaluation. Employing a conservative approach, TVA identified specific actions as a result of ECSP evaluations; however, the majority of these actions did not require physical changes to the plants. A substantial number of actions involved document reviews, clarifications, and revisions. A few actions had a greater impact and resulted either in physical plant rework or in management policy changes throughout the organization.

The ECSP concluded that the overall, multitiered management program and methodology by which TVA's nuclear plants were designed, constructed, and operated were generally effective in accomplishing their intended purposes. Although specific problems were found by the ECTG in various practices and activities of the TVA management system, there were and are sufficient checks and balances in the system to offset these individual problems and avoid any condition constituting an unacceptable risk to the health and safety of the public. The evidence did not indicate that TVA had willfully allowed cost and schedule to override safety and quality considerations or that safety and quality had been compromised to the extent that the health and safety of the public could not be reasonably assured. However, managers may have succumbed to cost and schedule pressures on occasion without realizing that work quality might suffer as a result.

Overall, the ECSP concluded that completion of the specific actions identified by the program and continued adherence to the numerous actions outlined in the revised CNPP should lead to correction of the problems identified within the scope of

concerns evaluated by the ECTG. The correction of these problems in turn plays an important role in TVA's overall effort to restore the nuclear program to normal operations. Chapter V provides a detailed description of the ECP in effect since February 1986, which was retitled "Concerns Resolution" in July 1991.

2.5 Generic Industry Issues

Generic industry issues were considered in the identification of nonconforming issues and development of corrective actions described in Chapter III. As part of WBN normal licensing activities, identification of generic design and construction issues applicable to WBN was accomplished through a review of the following industry documents:

- NRC IE Bulletins
- NRC Generic Letters
- NRC Information Notices
- INPO Plant Evaluation Reports
- Licensee Event Reports (LERs) - SQN/BFN

Lessons learned from industry experience and input received from the WBPT and several industry experts were considered in the development of the Systematic Evaluation plans and corrective actions. The WBPT visited nuclear plants that underwent verification programs similar to those that were being planned at WBN and interviewed personnel directly associated with such programs. The experience gained from these interviews was incorporated in developing the Systematic Evaluation. The WBPT reviewed the documented plans for issue discovery and issue resolution from a number of nuclear power plant projects that have recently undergone operating license review.

The reviews, as well as recent experiences at SQN and BFN, were also used to develop the approach taken in the Systematic Evaluation.

2.6 WBN Task Force

In addition to strengthening the corporate organization and controls described in the CNPP, TVA established a WBN Task Force on March 19, 1986, to investigate plant-specific problems. The scope of this Task Force was to:

- Review the implementation of the CNPP at WBN.

- Review problems and deficiencies that were identified during design, construction, and preparations for operating WBN.

- Initiate specific actions to resolve identified problems and confirm that actions taken suitably address the root cause and resolve the problems.

The WBN Task Force was composed of individuals who had extensive experience in the nuclear industry. Its principal area of responsibility was to review the identified nonconforming issues and to ensure that appropriate corrective actions were established to resolve those issues. The WBN Task Force established criteria for evaluating the issues and worked closely with line managers to develop corrective actions for the identified issues. WBN Task Force actions were guided by the CNPP and the industry experience of the WBN Task Force members. The WBN Task Force effort covered the nonconforming issues identified by sources such as the WBN QA program, employee concerns, the NRC, and the numerous independent reviews that were performed at WBN.

The WBN Task Force completed the analysis of known nonconforming issues and established several corrective actions. This initiative was the first action taken by TVA to consolidate issues and develop corrective actions (which the WBN Task Force originally identified as Special Programs) to address similar issues collectively through an integrated plan. Chapter III describes many of these nonconforming issues and corrective actions.

3.0 ISSUE IDENTIFICATION AND INTEGRATION

As described in Section 2 of this chapter, the issue discovery process resulted in identification of a number of nonconforming issues. Through the efforts of the WBN Task Force initially, and finally the WBPT, identified issues were consolidated into groups of similar issues and issues that affect the same population of hardware, e.g., cables, piping, conduit and conduit supports, and heating, ventilating, and air conditioning (HVAC) ducts and their supports. These consolidated issues were evaluated for root cause and generic applicability and bounded to form the basis of the CAPs and Special Programs described in Chapter III. This process of integrating and consolidating the issues into broad scope programs enables WBN management to manage and implement corrective actions more effectively and efficiently, and to assure a consistent approach for the resolution of various issues. Methods used to develop the CAPs and Special Programs are described in Section 4 of this chapter and also in Chapter III.

4.0 WATTS BAR PROGRAM TEAM

As discussed in Section 2 of this chapter, by September 1987 significant progress had been made toward the discovery of nonconforming issues that required corrective actions. However, TVA recognized the need for an integrated systematic evaluation of WBN and established the WBPT with the objective of looking beyond the known problems and performing an overall evaluation of plant design and construction in order to identify the necessary corrective actions to provide reasonable assurance that WBN meets licensing requirements and TVA commitments.

In order to meet its objective, the WBPT reviewed considerable data from a variety of sources, including internal and external discovery programs performed in the past at WBN and the numerous resulting corrective action programs. The WBPT visited several nuclear plants that have had verification programs similar to those considered by the WBPT for WBN and interviewed personnel directly associated with such programs. Based on these reviews, the WBPT developed the WBPP, which described an overall plan for the Systematic Evaluation and development of corrective actions for WBN. The WBPP described the composition and responsibilities of the WBPT, the objective and scope of the WBPP, program principles and methodology, and the Systematic Evaluation process, including the plan to perform a VSR of WBN design and construction. The WBPP was submitted to the NRC on May 27, 1988 (Ref. 37), and the plan was endorsed by NRC on June 27, 1988 (Ref. 12). This section will briefly discuss the contents of the WBPP.

4.1 Composition and Responsibilities of WBPT

The WBPT was composed of both TVA employees and contractors, and included a chairman and members with experience in the general categories of engineering, construction, quality assurance, licensing, and electrical/instrumentation and controls. The WBPT members were appointed by the Senior Vice President, Nuclear Power and were selected on the basis of their experience and independence from WBN design and construction.

The WBPT was responsible for developing the WBPP and recommending actions to be taken to assure licensability of WBN. The WBPT's responsibility also included the development of the WBNPP. The WBPT made recommendations to the Senior Vice President, Nuclear Power for specific work to be conducted by the line organizations at WBN as part of the Systematic Evaluation and for actions to be taken to correct identified nonconforming issues.

To provide additional assurance that the WBPP was properly developed and executed, six senior independent oversight advisors were appointed by the Senior Vice President, Nuclear Power from outside TVA to review the program activities periodically and report to him individually. The oversight advisors reviewed the completeness of coverage provided by the Systematic Evaluation and the adequacy of defined corrective actions to assure licensability of WBN.

4.2 Watts Bar Program Plan

The objective, scope, and methodology of the WBPP developed by the WBPT are described in the following sections.

4.2.1 Objective

The objective of the WBPP was to perform a Systematic Evaluation of WBN design and construction, to develop corrective actions as required, and to prepare the WBNPP.

4.2.2 Scope

The scope of the WBPP included TVA design and construction of safety-related structures, systems, and components, their interface with the Nuclear Steam Supply System and vendor-furnished equipment, and any other areas directed by the Senior Vice President, Nuclear Power.

4.2.3 Program Methodology and Process

The WBPP was comprised of three phases: Planning, Evaluation, and Development of Corrective Actions. The activities performed in the three phases are depicted in Figure II-1, and are described in the following paragraphs.

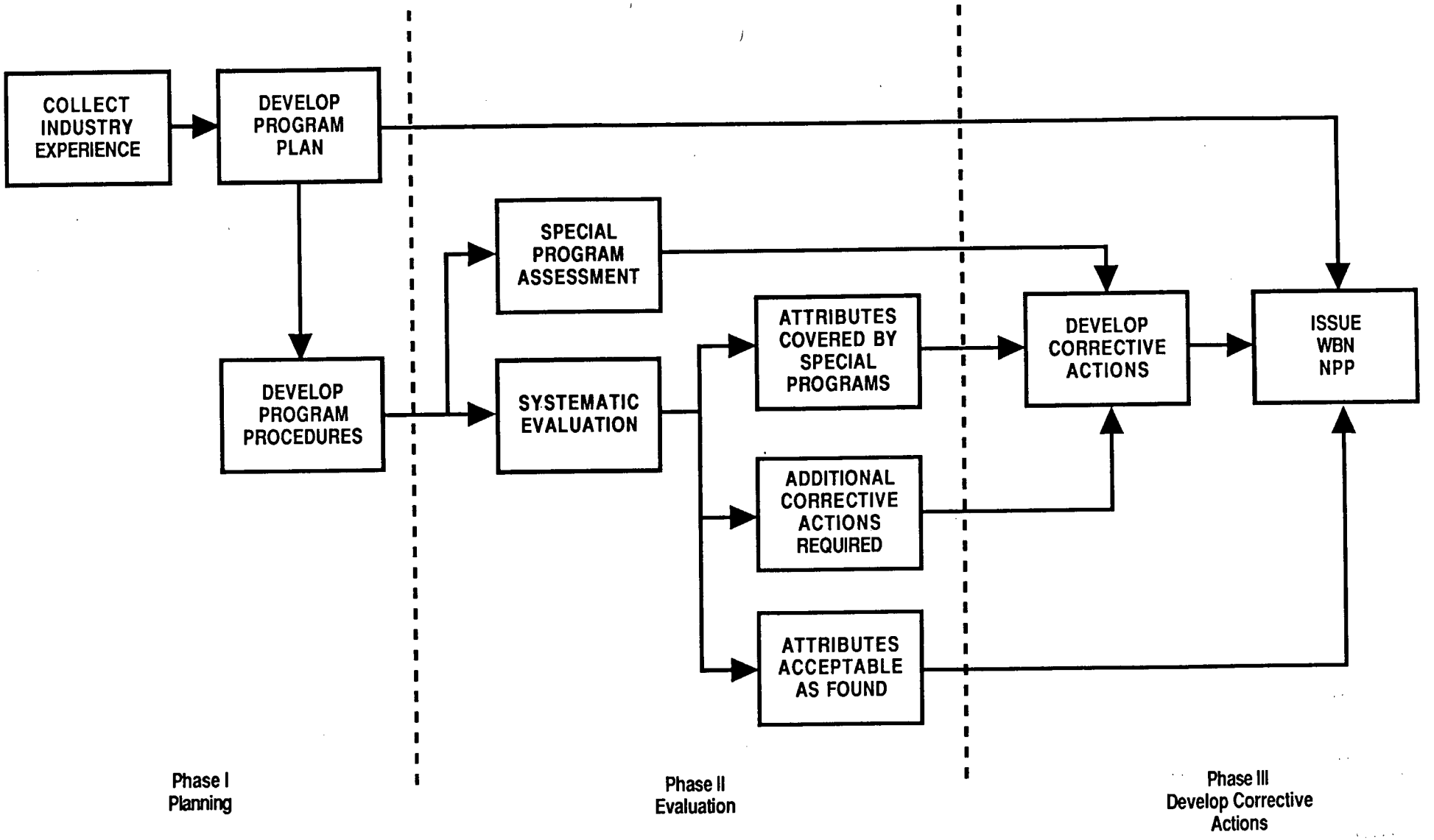
- Phase I: Planning

  During the planning phase, the WBPT prepared the WBPP, which was approved by the Senior Vice President, Nuclear Power and endorsed by the NRC.

  The WBPT incorporated in this Plan information obtained from other utilities' experiences with similar issues, and information from other sources such as industry experts, as well as SQN, BFN, and Bellefonte Nuclear Plant (BLN).

- Phase II: Evaluation

  During Phase II, a Systematic Evaluation was performed to identify which plant elements and attributes related to design, construction, and QA/QC records were acceptable as found, which were adequately covered by the existing Special Programs, and which required additional corrective actions. Particular attention was given during the Systematic Evaluation as to how specific issues previously identified at other nuclear plants, including SQN, BFN, and BLN, were addressed at WBN. As part of this Systematic Evaluation, a VSR was performed. The Systematic Evaluation is discussed in detail in Section 5 of this chapter, and the VSR is discussed in Section 6.



WATTS BAR PROGRAM PLAN

FIGURE II-1

- Phase III: Development of Corrective Actions

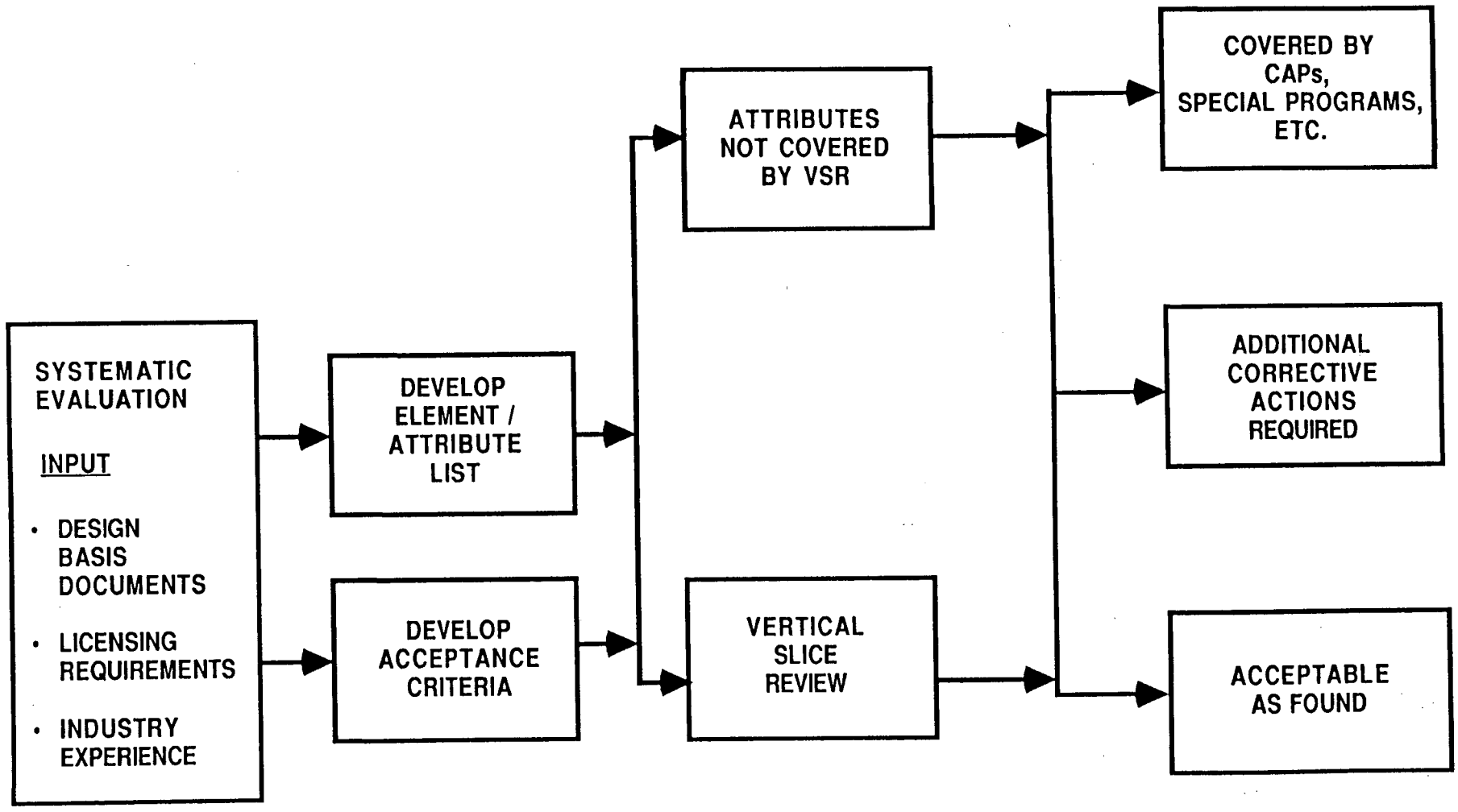
  Phase III involved the development of corrective actions, as necessary, to bound and resolve the identified nonconforming issues. The WBPT reviewed Special Programs developed as a result of the WBN Task Force effort. It also reviewed the corrective actions identified in various corrective action documents. These reviews were conducted to group the corrective actions of a broad, generic, and programmatic nature into CAPs. Other significant corrective actions were covered by Special Programs. The single-issue, specific corrective actions are addressed by the TVA corrective action process. The discrepancies identified by the VSR are either covered by the scope of CAPs, Special Programs, and existing corrective action documents, or new corrective actions have been developed to resolve the specific discrepancies. The CAPs and Special Programs were reviewed by the WBPT for their thoroughness to resolve the issues, applicable acceptance criteria, consistency with industry approaches taken for issue resolution, and assurance that recommended corrective actions comply with WBN licensing requirements and TVA commitments. These CAPs and Special Programs are described in Chapter III.

4.3 Continuation of WBPT Activities

After the issuance of the WBNPP, the WBPT monitored its implementation and reported observations directly to TVA's corporate and line managers. In addition, the WBPT reviewed and approved changes to CAPs and Special Programs. The WBPT completed its responsibilities and issued its final report and recommendations in the Watts Bar Program Team Closure Report in May 1991 (Ref. 115), and monitoring and verification functions were assumed by WBN line organizations.

5.0 SYSTEMATIC EVALUATION

The Systematic Evaluation process is shown in the flow chart in Figure II-2. As shown on the flow chart, an Elements/Attributes (E/A) List and acceptance criteria were developed based on design basis documents (DBDs), licensing requirements, and industry experience. The plant elements and associated attributes were systematically evaluated through the VSR or other programs, and nonconforming issues requiring corrective actions were identified. These corrective actions were either covered by CAPs, Special Programs, and existing CAQRs, or new corrective actions were developed as discussed in Chapter III. The VSR, discussed in detail in Section 6 of this chapter, was a principal program used in this process. The Systematic Evaluation process is discussed in more detail in the following subsections.



SYSTEMATIC EVALUATION PROCESS

FIGURE II - 2

5.1 Development of E/A List

To facilitate the performance of the Systematic Evaluation, an E/A List was developed that was comprised of elements and attributes associated with the design, construction, and QA/QC records of WBN safety-related structures, equipment, and components. The plant elements include individual safety-related structures, equipment, and components (e.g., masonry walls, pumps, and cables, respectively). The attributes are quality characteristics of an element related to the capability of the element to perform its intended function. For example: for an element such as pumps, specified mounting details are design attributes, the installed mounting details are construction attributes, and the inspection records associated with the installed mounting details are QA/QC records attributes. As an example, Figure II-3 illustrates the design, construction, and QA/QC records attributes for the element group cable trays and risers. The E/A List contains approximately 80 elements and over 3,300 attributes.

Input for the development of the E/A List was derived from the WBN licensing requirements, safety-related design documents, and industry experience. The E/A List was prepared by an experienced architect/engineer firm and was reviewed by the TVA line organizations. The E/A List was also reviewed by the WBPT to assure that it represents essential plant elements and attributes such that the Systematic Evaluation based on this List would detect design and construction issues that are in nonconformance with licensing requirements and TVA commitments.

5.2 Acceptance Criteria

Acceptance criteria for the conduct of the Systematic Evaluation were based on the fundamental principle that elements and attributes must be confirmed to be in compliance with licensing requirements and TVA commitments. The acceptance criteria were also based on DBDs and industry experience. The adequacy of elements and attributes was evaluated in a number of ways including VSR, CAPs, Special Programs, ECSP, or other special assessments. The WBPT used the acceptance criteria in reviewing the adequacy of the CAPs and Special Programs, rather than the individual elements and attributes covered by these programs. The VSR Team (VSRT) used the acceptance criteria in evaluating the adequacy of various elements and attributes reviewed by them. For design, the acceptance criteria were extracted from DBDs, e.g., design criteria and system descriptions. For construction, the acceptance criteria were extracted from design output documents, such as drawings, procurement specifications, and construction specifications. For QA/QC records, the acceptance criteria for these evaluations were extracted from procedures based on the licensing requirements with particular emphasis given to those which establish the adequacy of the as-constructed condition in the plant.

E/A LIST
TVA - WATTS BAR NUCLEAR PLANT
DESIGN, CONSTRUCTION, QA/QC RECORDS

ATTRIBUTE	SUB-ATTRIBUTE

ELEMENT GROUP: CABLE TRAYS AND RISERS

DESIGN

- CABLE BENDING RADIUS
- CABLE SUPPORT
- CABLE WEIGHT LOADING/CABLE FILL
- CONFIGURATION
- COVERS (TOP AND BOTTOM)
- GROUNDING
- LOADS, LOAD COMBINATIONS, AND ALLOWABLE STRESSES
- MATERIALS
- ROUTING
- SEALS AND WRAPS
- SEGREGATION IDENTIFICATION (CORRECTLY ASSIGNED)
- SEISMIC QUALIFICATION
- SEPARATION (PHYSICAL)
- TOLERANCES
- TYPE (SIZE)

E/A LIST

FIGURE II-3
(Page 1 of 3)

E/A LIST
TVA - WATTS BAR NUCLEAR PLANT
DESIGN, CONSTRUCTION, QA/QC RECORDS

ATTRIBUTE	SUB-ATTRIBUTE
ELEMENT GROUP: CABLE TRAYS AND RISERS	
CONSTRUCTION	
- CABLE PROTECTION	- EDGE PROTECTION/HALF ROUNDS
- CABLE SUPPORT	
- CONDUIT TERMINATIONS	
- CONFIGURATION	
- COVERS	- TYPE AND SIZE INSTALLED
- GROUNDING	
- PHYSICAL DAMAGE	- TRAY
- SEGREGATION	- CORRECTLY ASSIGNED/INSTALLED
IDENTIFICATION	
- SEPARATION (PHYSICAL)	
- SPLICE PLATES	- CORRECT BOLTS TORQUED TO DESIGN VALUES
- SPLICE PLATES	- TYPE AND SIZE
- UNDOCUMENTED ATTACHMENTS ON TRAY	

E/A LIST

FIGURE II-3
(Page 2 of 3)

E/A LIST
TVA - WATTS BAR NUCLEAR PLANT
DESIGN, CONSTRUCTION, QA/QC RECORDS

ATTRIBUTE	SUB-ATTRIBUTE
ELEMENT GROUP: CABLE TRAYS AND RISERS	
QA/QC RECORDS	
- DESIGN RECORDS	- AS-DESIGNED DRAWINGS
	- DESIGN CALCULATIONS
	- DESIGN CHANGE REQUESTS
	- DESIGN REPORTS
	- SYSTEMS DESCRIPTIONS/DESIGN CRITERIA
- INSTALLATION-CONSTRUCTION RECORDS: GENERAL	- AS-CONSTRUCTED DRAWINGS AND RECORDS
- INSTALLATION-CONSTRUCTION RECORDS: ELECTRICAL AND I&C	- FIELD WORKMANSHIP CHECKLIST OR EQUIVALENT LOGS
- INSTALLATION-CONSTRUCTION RECORDS: GENERAL	- FINAL INSPECTION RESULTS AND RELEASES
- INSTALLATION-CONSTRUCTION RECORDS: GENERAL	- SPECIFICATIONS AND DRAWINGS
- MANUFACTURING RECORDS	- CERTIFICATES OF COMPLIANCE
- MANUFACTURING RECORDS	- VENDOR DRAWINGS AND RECORDS
- PROCUREMENT RECORDS	- PROCUREMENT SPECIFICATION/ PURCHASE ORDERS/AMENDMENTS

E/A LIST

FIGURE II-3
(Page 3 of 3)

5.3 Coverage of E/A List

Evaluation of the design and construction of WBN was performed principally by means of the VSR, as described in Section 6 of this chapter. The objective of the Systematic Evaluation was to cover the elements and attributes included in the E/A List, and the VSR provided coverage for a majority of the elements and attributes. In addition to the coverage provided by the VSR, many of the elements and attributes were covered by CAPs and Special Programs. As part of the Systematic Evaluation, the WBPT reviewed CAPs and Special Programs for adequacy, as described in Chapter III, and the coverage provided by these programs to the elements and attributes was recorded in a Systematic Evaluation Matrix. This matrix also recorded the widespread coverage of elements and attributes provided by the VSR.

The adequacy of elements and attributes not covered by the VSR or other programs was addressed by Attribute Coverage Reports (ACRs). The ACRs demonstrated the adequacy of the attributes, or recommended additional reviews. At the time the Systematic Evaluation was completed, fewer than 20 of the more than 3,300 attributes required additional reviews. Upon further consideration of the ACR that addressed the diesel generator, approximately 50 attributes were added. These reviews have been performed to provide an additional demonstration of adequacy of these attributes. Appropriate corrective actions will be developed for nonconforming issues identified. Most of the ACRs were prepared by the VSRT, which benefited from its knowledge of the reviews already performed as part of the VSR. This also ensured an independent evaluation of the elements and attributes covered by the ACRs.

Through the above process, a documented evaluation of the plant elements and their associated attributes has been completed. Therefore, overall conclusions about the adequacy of WBN design and construction can be made. These conclusions are stated in Section 7 of this chapter.

5.4 Systematic Evaluation Matrix

The Systematic Evaluation Matrix shows the coverage of elements and attributes contained in the E/A List by various programs, e.g., VSR, CAPs, Special Programs, ECSP. Because of the large data base, the Matrix is computerized. In addition to listing the programs providing coverage for the elements and attributes, the Matrix also shows whether the evaluation found an attribute to be acceptable or discrepant. For the discrepant attributes, the document that provides corrective actions is also listed. Thus, the Systematic Evaluations Matrix provides comprehensive documentation of the results of the Systematic Evaluation.

6.0 VERTICAL SLICE REVIEW

As described in the previous sections, the VSR was a principal element of the Systematic Evaluation. The VSR provided an independent, systematic, structured, and comprehensive evaluation of the adequacy of the design and construction of WBN structures, systems, and components. The VSR was performed during late 1988 and early 1989.

The VSR utilizes a top down review approach, which is conducted by comparing licensing requirements and DBDs to design output documents (e.g., drawings and construction specifications) and finally to installed hardware and associated QA/QC records for representative elements of the systems selected. Figure II-4 illustrates this process. The system numbers in this figure are for illustration purposes only. It may be noted that normally a VSR is limited to the review of plant design, but at WBN, the VSR was expanded by the WBPT to include a review of the construction and QA/QC records as well.

Based on its independence from WBN design and construction, its experience in nuclear plant design and its experience with such independent reviews, the architect/engineer firm of Sargent & Lundy was selected to perform the VSR. The VSR was performed under a strict protocol, with the WBPT acting as a third-party intermediary to ensure the independence of the VSRT.

The VSR was conducted in accordance with a plan approved by the WBPT. The NRC staff's review of the plan, documented in its letter dated August 31, 1988 (Ref. 38), concluded that the staff "considers the methodology as proposed by Sargent & Lundy to be reasonable for a project of this nature." The VSR included vertical and horizontal design, construction, and record verification in each of the three principal engineering disciplines of the WBN design (i.e., mechanical, civil/structural, and electrical). The vertical review consisted of a detailed assessment of two representative safety-related systems, the component cooling water system and the electrical emergency auxiliary power system. The horizontal review included an evaluation of the four plant design areas not covered by the vertical review. These four design areas were high-energy line break, fire protection, control room habitability, and buried pipe and electrical duct bank design.

Five areas, selected by the WBPT based on its review of the Special Programs, were excluded from the scope of the VSR. The WBPT determined that these areas were adequately covered by the existing, well-defined Special Programs. These five programs are the Hanger and Analysis Update Program (HAAUP), Concrete Quality, Equipment Qualification, Detailed Control Room Design Review (DCRDR), and Welding. These programs are described in Chapter III. The NRC staff agreed in their letter providing results of their review of the WBPP (Ref. 12) that "sufficient bases exist for the exclusion." In response to NRC staff's comment in their letter providing the results of their review of the VSR Plan (Ref. 38),

Vertical Slice Review – General Concept

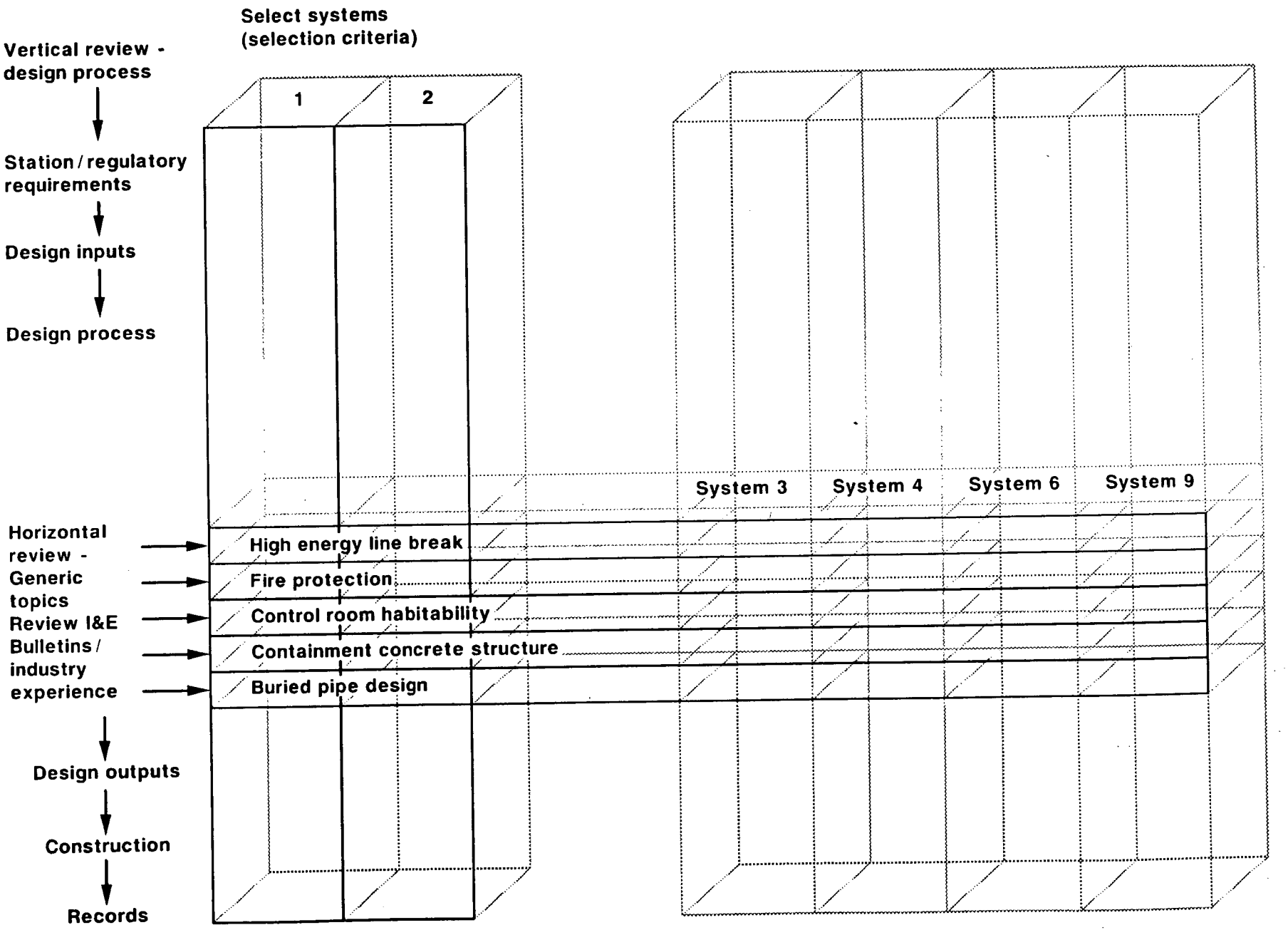


FIGURE II-4

TVA confirmed that "the VSRT has concluded that the exclusion of the five identified programs will not invalidate the intent of the VSR program because the design interfaces with the exclusion programs are being reviewed, where applicable, by the VSRT." (Ref. 39).

The VSR was a comprehensive review, involving the expenditure of approximately 70,000 hours by the VSRT, and 200,000 hours by the TVA line organizations to provide requested documents, interface with the VSRT, and respond to the VSR findings. The VSRT reviewed over 450 components under engineering review, approximately 400 under construction review, and approximately 130 under QA/QC Records review, using 186 detailed checklists and a review of over 3,500 documents. Many of the components reviewed for construction and records verification were common to those for engineering verification, so that the interface between engineering, construction, and records could be reviewed adequately.

6.1 Methodology

The VSR entailed a detailed review of design, construction, and QA/QC records for selected structures, systems, and components. The potential discrepancies were documented by the VSRT reviewers in the Observation Reports (ORs). The Internal Review Committee (IRC), which was comprised of the Sargent & Lundy Mechanical, Structural, and Electrical Design Directors and chaired by the Head, Quality Assurance Division, reviewed each OR and determined whether or not the observation was a valid discrepancy. A discrepancy was defined as a design, construction, or records-related condition that was confirmed, after the IRC's review, to be in nonconformance with the licensing or other safety-related documents. Discrepancies were documented in Discrepancy Reports (DRs).

The DRs were sent to the WBN line organizations for resolution, with copies to the WBPT. For each discrepancy, the line organizations determined the design and safety significance of the discrepancy, the extent-of-condition, and the action necessary to correct the discrepancy. For design-significant discrepancies, the root cause and action necessary to prevent recurrence were also provided. These were all documented by the line organizations in a Resolution Report (RR).

The VSRT reviewed the RRs. The reasons for accepting or rejecting TVA's resolution of the discrepancy were documented by the IRC in a Completion Report (CR). The IRC also performed a trend analysis of all valid discrepancies by evaluating their nature, significance, and frequency of occurrence.

WBN line organizations also documented the discrepancies and their resolutions using the corrective action process in accordance with the site procedures. Because of the importance of VSR conclusions to the licensability of WBN, VSR corrective actions have been

provided with supplemental controls in addition to TVA corrective action process controls. Site procedures have been developed to provide the controls for tracking and implementing the VSR corrective actions as described in Section 3 of Chapter IV.

6.2 Results

A total of 505 DRs, representing 1,040 specific discrepancies, resulted from the VSR. There were 60 DRs determined to be design significant because the discrepancies were found to be in nonconformance with the appropriate code, standard, or licensing requirements; however, none of these 60 DRs was found to be safety significant. A safety-significant discrepancy is a condition which, if it remained undetected, could result in the loss of capability of the affected system or structure to perform its intended safety function. Where a discrepancy was covered by an existing corrective action, in many cases the significance was not determined prior to the time the VSR Report was issued. These discrepancies are being evaluated for significance as part of the corrective action process and none have been found to be safety significant to date.

The VSR identified a number of issues of which TVA was already aware and was in the process of correcting. However, the technical requirements and method of implementation for many of these programs had not been fully developed at the time of the VSR. The results of the VSR provide specific technical information to assist TVA in the development and implementation of these programs.

The engineering verification determined that most licensing commitments have been appropriately implemented in the WBN design, although some commitments were not fully implemented. Most discrepancies were resolved by documentation corrections and some resulted in a requirement for field modifications. The most significant issue identified was the adequacy of engineering calculations. Due to the incomplete status of the design documents, including engineering calculations, the VSRT could not verify the technical adequacy of the systems. However, the VSRT concluded that the corrective actions related to the engineering calculations and the licensing verification activities of the Design Baseline and Verification Program (DBVP) (see Chapter III, Section 2.3) are reasonable, and when fully scoped, technically defined, and implemented should provide a basis to confirm that the structures, systems, and components are adequate.

The VSRT concluded that, when the construction of WBN is viewed as a whole, the main elements of the plant were conservatively designed and adequately constructed. However, design documents were found to lack specific details in some areas, and controls were not adequately implemented during construction to ensure engineering acceptance of field changes. The VSRT agreed that completion of corrective actions identified by TVA in the RRs should ensure that the as-constructed, or modified, components will meet TVA's licensing commitments.

In the QA/QC records area, the VSRT concluded that the records reviewed by the VSRT generally conform to the controlling procedures. However, a concern was identified that a number of construction discrepancies identified by the VSRT were not reflected in the original inspection records examined by the VSRT as part of its records review. The VSRT believed that, due to the extent of many CAPs involving construction verification programs, this issue will be addressed during the implementation of these programs. The VSRT concluded that the identified corrective action in this area should result in a set of records that support TVA's licensing commitments.

Seven DRs remained unresolved when the final VSR report was issued (Ref. 40). The WBPT coordinated resolution of these between the VSRT and the line organizations. These DRs are now fully resolved and the resolutions have been accepted by the VSRT.

The WBPT reviewed each of the 60 design-significant DRs for adequacy of resolution and recommended enhancement to 3 DRs. These enhancements have been reviewed and accepted by the VSRT.

The VSR Final Report (Ref. 40) includes several recommendations that go beyond the corrective actions required to resolve DRs. These recommendations were evaluated by the WBN line organizations, and the results of the evaluations were provided to and accepted by the WBPT.

6.3 Conclusion

The VSR Final Report stated the following in Section 2.1.4, "Overall Plant Assessment":

> "As a result of the extent-of-condition and root cause assessment for the discrepancies, it is possible to draw an overall assessment of the WBN based on the VSR. Assuming successful completion of the planned corrective action programs, as modified by the VSR commitments, the VSRT concludes that there is sufficient assurance that the design, construction, and records should comply with the applicable licensing requirements and be technically adequate."

The 16-volume VSR Final Report (Ref. 40) was submitted by Sargent & Lundy on March 8, 1989, with copies sent directly to the NRC for its information and use. The VSRT presented the results of the VSR to NRC in a meeting on March 22, 1989.

7.0 CONCLUSION

Prior to the establishment of the WBPT, many nonconforming issues and associated corrective actions had been identified at WBN through various internal and external reviews. However, in late 1987 the WBPT undertook a Systematic Evaluation of WBN to look beyond the already known issues to provide reasonable assurance that remaining nonconforming issues were identified and corrective actions defined. The evaluation was performed independently and comprehensively, with auditable documentation developed. Based on the evaluations performed, it is concluded that there is reasonable assurance that upon completion of the corrective actions to resolve the identified issues, WBN design and construction will meet the licensing requirements and TVA commitments.

No new safety-significant issues have been identified to date as a result of the Systematic Evaluation. The WBPT has reviewed the identified nonconforming issues and corrective actions have been developed to thoroughly resolve these issues. Root cause determinations have been performed for the significant issues, and recurrence control measures have been identified. The programs to address these are described in Chapter III.

3

III. CORRECTIVE ACTIONS

1.0 INTRODUCTION

Through the issue discovery process and the Systematic Evaluation, a number of nonconforming issues were identified at WBN. With the effort of the WBN Task Force initially, and finally the WBPT, the identified issues were consolidated into groups of similar issues such as QA/QC Records, design control, and issues affecting the same population of hardware (e.g., cables, piping, conduit and conduit supports, HVAC ducts and their supports). The broad scope, generic, or programmatic issues formed the basis of the CAPs (Refs. 13 through 31). Other significant issues formed the basis of the Special Programs. Specific, isolated issues continue to be resolved through the corrective action process.

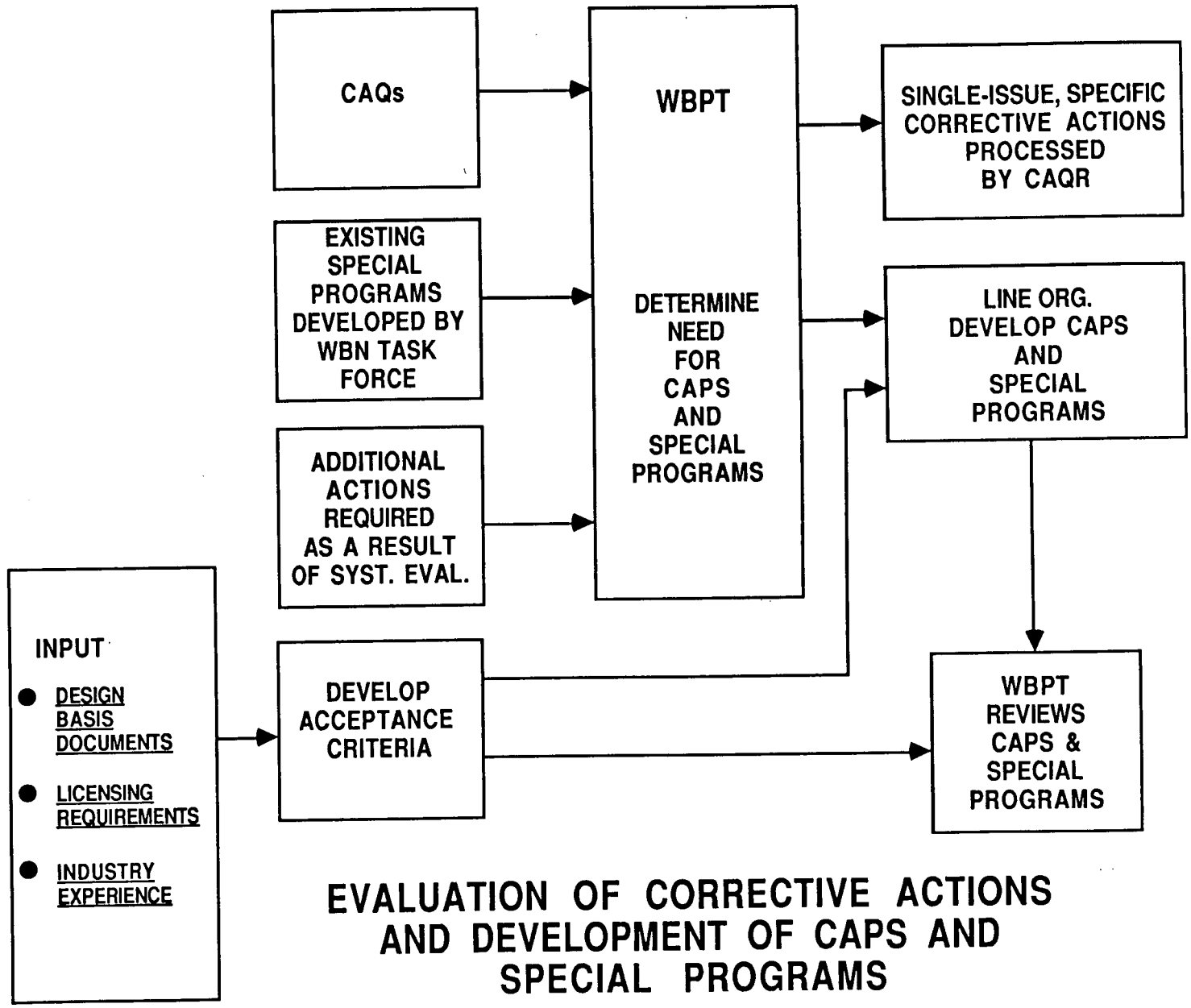
The process of evaluation of corrective actions and the development of CAPs and Special Programs is shown in Figure III-1. The WBPT evaluated the original Special Programs developed by WBN Task Force, CAQRs, and the additional corrective actions identified as a result of the Systematic Evaluation to determine the need for CAPs and any new Special Programs. As a result of this evaluation, five new Special Programs were added to the list (Containment Cooling, Mechanical Equipment Qualification, Microbiologically Induced Corrosion, Radiation Monitoring System, and Use-As-Is CAQ). The listing of 27 original Special Programs included in the WBPP is included in Table III-1 and a discussion of the disposition of these programs is included in Section 3.12 of this chapter.

The line organizations developed CAPs and Special Programs using the appropriate acceptance criteria, which were based on DBDs, licensing requirements, TVA commitments, and industry experience. The WBPT reviewed the CAPs and Special Programs for adequacy of scope and approach, and recommended the CAPs to the Senior Vice President of Nuclear Power for approval.

Section 2 of this chapter provides a summary description and listing of 18 CAPs. The CAPs were submitted to NRC to obtain their concurrence with the approach described in the CAPs. A formal presentation of selected CAPs was also made to the NRC to address the NRC staffs' specific questions as well as questions regarding TVA's overall approach in using CAPs as a tool for resolving nonconforming issues.

Section 3 of this chapter provides summary descriptions and a listing of 11 Special Programs. Since many of these Special Programs are narrow in scope, and for many others substantial progress had already been made and several reports submitted to NRC, Special Programs were not sent to NRC for prior endorsement of approach. However, the WBPT has reviewed and accepted these Special Programs in a manner similar to the CAPs.

Section 4 of this chapter provides the resolution process for specific isolated issues which are not addressed by CAPs or Special Programs.



EVALUATION OF CORRECTIVE ACTIONS AND DEVELOPMENT OF CAPS AND SPECIAL PROGRAMS

FIGURE III - I

TABLE III-1

WBPP - LIST OF SPECIAL PROGRAMS
(Page 1 of 2)

No.	Original Special Program Description	Coverage by Existing CAP & Special Programs
1.	Welding Project	Welding CAP
2.	Concrete Quality Program	Special Program
3.	Environmental Qualification Program	Special Program
4.	Design Basis Document and Licensing Program	DBVP CAP
5.	Hanger and Analysis Update Program	HAAUP CAP
6.	Electrical Issues Program	Electrical Issues CAP
7.	Q-List Development	Q-List CAP
8.	Piece Parts Program	Replacement Items CAP
9.	Calculation Program	DBVP CAP
10.	Prestart Test Program	Prestart CAP
11.	Instrumentation Lines	Instrument Lines CAP
12.	Conduit Supports	Electrical Conduit & Conduit Support CAP
13.	Equipment Seismic Qualification	Equipment Seismic Qualification CAP
14.	Containment Isolation	Addressed in Chapter III, Section 3.12.1
15.	Unit 1/Unit 2 Interface	Addressed in Chapter III, Section 3.12.3
16.	Detailed Control Room Design Review	Special Program
17.	Specifications Improvement Program	Addressed in Chapter III, Section 3.12.2
18.	Heat Code Traceability	Heat Code Traceability CAP

TABLE III-1

WBPP - LIST OF SPECIAL PROGRAMS
(Page 2 of 2)

No.	Original Special Program Description	Coverage by Existing CAP & Special Programs
19.	Appendix R Program	Fire Protection CAP
20.	Protective Coatings	Special Program covered in Containment Cooling
21.	Safety-related Welded Ductwork	HVAC CAP
22.	Design Change Improvements Program	DBVP CAP
23.	Master Fuse List	Special Program
24.	NUREG-0612 Control of Heavy Loads	Addressed in Chapter III, Section 3.12.4
25.	Soil Liquefaction	Special Program
26.	Moderate Energy Line Break Studies	Special Program
27.	QA/QC Records	QA Records CAP

Completion of the corrective actions in accordance with the plans described in this chapter will provide reasonable assurance that WBN complies with licensing requirements and TVA commitments. In addition, the QA/QC inspection records for the previously accepted nonconforming installations will be supplemented with new documentation that attests to the acceptability of the installation upon completion of the corrective actions. Corrective actions will be taken in parallel with CAP implementation to correct identified damaged, loose, or missing hardware deficiencies. Also, walkdowns of systems identified in the Prestart Test Program CAP will be performed before fuel load to identify and correct additional damaged, loose, or missing hardware. Verification that corrective actions are accomplished in accordance with the established plans and procedures, and that adequate documentation exists to substantiate the acceptability of WBN design and construction will be performed as described in Chapter IV.

2.0 CORRECTIVE ACTION PROGRAM PLANS

CAPs were developed to bound and resolve all broad scope, programmatic and generic issues. Typically, a CAP plan includes a description of the issues, sources, the scope of corrective actions to resolve the issues, identification of root causes and actions to prevent recurrence.

The WBPT has reviewed each CAP to ensure that:

- The issue addressed is adequately defined.
- Proposed corrective actions are adequate to resolve the issue effectively and thoroughly.
- The root cause analyses of the issue and actions to prevent recurrence are adequate.
- The recommended corrective actions are consistent with licensing requirements.
- There is no unnecessary duplication in the various programs, and interfaces between various programs are adequately described.
- The corrective action approach for WBN has been developed with consideration of corrective actions taken for similar issues at other TVA plants and elsewhere in the industry.

All the CAPs were submitted to the NRC to obtain their concurrence with the CAP approach. A formal presentation of selected CAPs, as proposed by TVA and agreed to by the NRC, was also made subsequent to the CAP submittals to discuss the CAPs and address the NRC staff's specific questions and other concerns regarding overall approach in using CAPs as

a tool for resolving nonconforming issues. The approach for addressing the issues identified in each CAP has been endorsed by the NRC either by SER or IR.

The implementation and closure of each CAP will be completed utilizing the approach as outlined in Chapter IV.

NRC's review of the CAPs and their implementation may result in changes to their scope. In such cases, appropriate revisions to the CAPs will be made in accordance with established procedures and with proper approvals.

The following CAPs are addressed in this chapter:

- Cable Issues
- Cable Tray and Cable Tray Supports
- DBVP Program
- Electrical Conduit and Conduit Support
- Electrical Issues
- Equipment Seismic Qualification
- Fire Protection
- Hanger and Analysis Update Program (HAAUP)
- Heat Code Traceability
- HVAC Duct and Duct Supports
- Instrument Lines
- Prestart Test Program
- QA Records
- Q-List
- Replacement Items Program (Piece Parts)
- Seismic Analysis
- Vendor Information
- Welding

The CAP summaries were developed to provide an executive overview of the CAPs, and are not intended to modify in any manner their scope or content. Actual CAPs must be consulted for detailed information and for the performance of any technical review.

2.1 Cable Issues

Various concerns related to cable installation and routing have been identified at WBN by TVA through Employee Concerns, CAQs, and NRC findings. This CAP addresses the adequacy of safety-related cable installations in the following areas:

- Silicone rubber insulated cables
- Cable jamming
- Cable support in vertical conduit
- Cable support in vertical tray
- Cable proximity to hot pipes
- Cable pullbys
- Cable bend radius

- Cable splices
- Cable sidewall bearing pressure
- Pulling cable through 90-degree condulets and mid-route flexible conduit
- Computerized Cable Routing System (CCRS) data base verification and validation
- CCRS software verification and validation

The Cable Issues CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was originally submitted to NRC on December 16, 1988 (Ref. 13). It was revised and Revision 1 was submitted on June 27, 1989 (Ref. 41). Revision 2 was issued to NRC on October 11, 1990 (Ref. 42). The NRC endorsed the approach by SER, dated April 25, 1991 (Ref. 43), with the exception of the issue of testing spare and abandoned cables. The test program is now complete (Ref. 127).

2.2 Cable Tray and Tray Supports

The Cable Tray and Tray Support CAP plan addresses Employee Concerns, CAQs, and NRC violations. The deficiencies can be categorized as lack of documented design qualification for certain cable tray hardware, installed configurations not complying with design output documents, and lack of documentation to verify previous reinspections.

The Cable Tray and Tray Supports CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was submitted to the NRC on November 18, 1988 (Ref. 14). The NRC endorsed the approach by SER, dated September 13, 1989 (Ref. 44).

2.3 Design Baseline and Verification Program

TVA became aware of inconsistencies in WBN licensing and design basis documentation as well as plant configuration issues as the result of several internal and external reviews that were conducted both at the plant and at the corporate level. The following conditions were identified by these reviews:

- Inconsistencies between the WBN Final Safety Analysis Report (FSAR) (Ref. 45) and WBN design documentation.

- Incomplete and some inconsistent design input information.

- Missing, incomplete, and out-of-date design calculations.

- Disagreements between the actual plant configuration and the as-constructed drawings.

The Design Baseline and Verification Program CAP plan addresses these issues and defines the scope, lists the root cause and provides corrective actions to resolve past issues and prevent recurrence. Revision 1 to the plan was submitted to NRC on October 20, 1988 (Ref. 15), and Revision 2 was issued to NRC on June 29, 1989 (Ref. 46). The approach was endorsed by NRC in SER, NUREG-1232, Volume 4 dated December 28, 1989 (Ref. 33). The DVBP CAP Plan was again revised to incorporate changes committed in TVA's February 5, 1990 response (Ref. 47) to NRC Inspection Report 390/89-12 dated November 20, 1989 (Ref. 48) and Revision 3 was submitted to NRC on July 31, 1990 (Ref. 49). The endorsement by NRC in SER, NUREG-1232, Volume 4 dated December 28, 1989 (Ref. 33) is still in effect.

2.4 Electrical Conduit and Conduit Support

The Electrical Conduit and Conduit Support CAP plan addresses Employee Concerns, CAQs, and Weld Project identified deficiencies in the conduit support program at WBN. Concerns can be categorized as involving discrepancies in design basis, design output not enveloping all design parameters, installed configurations not complying with design documents and discrepancies between installed configurations and inspection documentation.

The Electrical Conduit and Conduit Support CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was submitted to the NRC on November 18, 1988 (Ref. 16). The NRC endorsed the approach by SER, dated September 1, 1989 (Ref. 50).

2.5 Electrical Issues

Various concerns related to electrical installations, materials, and equipment have been identified at WBN by TVA through Employee Concerns, CAQs, and NRC findings. This CAP addresses the adequacy of safety-related electrical installations in the following areas:

- Flexible conduit installations
- Physical cable separation and electrical isolation
- Contact and coil rating of electrical devices
- Torque switch and overload relay bypass capability for active safety-related valves
- Adhesive-backed cable support mounts (ABCSM)

The Electrical Issues CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was submitted to the NRC on February 15, 1989 (Ref. 17). The NRC endorsed the approach by SER, dated September 11, 1989 (Ref. 51).

2.6 Equipment Seismic Qualification (ESQ)

The ESQ CAP plan addresses adverse condition issues regarding activities related to seismic qualification of Category I and I(L) equipment for WBN unit 1 and common. These issues are identified in NRC audit findings, Employee Concerns, corrective action documents, SQN lessons learned, and the DBVP. The primary issues are discrepancies between design and installation, inspection documents, and installation document retrievability and interface control.

The Equipment Seismic Qualification (ESQ) CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was initially submitted to NRC on December 23, 1988 (Ref. 18). It was subsequently revised and resubmitted on June 29, 1989 (Ref. 52). The NRC endorsed the approach by SER, dated September 11, 1989 (Ref. 53).

2.7 Fire Protection

The objective of the Fire Protection CAP plan is to complete the remaining fire protection work and provide additional assurance that the WBN Fire Protection Program satisfies WBN licensing requirements.

The Fire Protection CAP plan was initially submitted to the NRC on December 16, 1988 (Ref. 19). The NRC endorsed the approach by SER, dated September 7, 1989 (Ref. 54). The CAP plan was subsequently revised March 28, 1990 (Ref. 55) to provide for review of the existing Safe Shutdown and Fire Hazards Analysis based on the as-constructed configuration rather than a review of the engineering change notices (ECNs) issued since the original analysis. Supplemental Safety Evaluation Report (SSER) 6 of NUREG-0847, dated April 1991 (Ref. 56), confirms that the CAP is under review, and that the results will be included in a future SSER.

2.8 Hanger and Analysis Update Program

Throughout the design and construction of WBN, the NRC has issued various IE Bulletins, Notices, and Circulars on the subject of piping analysis and pipe support design. Additional piping and pipe support issues were identified through several avenues including employee concerns, CAQRs, NCRs, PIRs, SCRs, and internal and

external reviews. The HAAUP scope includes Category I piping, Category I(L) pressure boundary retention piping, Category I(L) position retention piping, instrument lines, and associated supports.

The identified issues have been grouped into three categories: interface control of design input/output; design/analysis methodology; and the level of design documentation.

The HAAUP CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was originally submitted to NRC on November 18, 1988 (Ref. 20). It was later revised and reissued to NRC on June 29, 1989 (Ref. 57). The NRC endorsed the approach by SER, dated October 6, 1989 (Ref. 58).

2.9 Heat Code Traceability

The Heat Code Traceability CAP plan addresses employee concerns regarding potential use of lower class piping and fitting materials in unit 1 ASME systems.

The Heat Code Traceability CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was submitted to the NRC on December 23, 1988 (Ref. 21). The plan was revised and resubmitted to NRC on June 26, 1989 (Ref. 59). The NRC endorsed the approach by Inspection Report Nos. 50-390/89-09 and 50-391/89-09, dated September 20, 1989 (Ref. 60). Revision 2 was submitted to NRC September 21, 1989 (Ref. 61). The Heat Code Traceability CAP is now complete (Ref. 62), and the Final Report was issued on February 9, 1990 (Ref. 63). The NRC, in Inspection Report Nos. 50-390/90-02 and 50-391/90-02, dated March 15, 1990 (Ref. 64), concluded that the only remaining issue was that TVA needed to provide appropriate FSAR revision. TVA provided the FSAR revision to the NRC in Amendment 64. The NRC accepted the changes by letter, dated March 29, 1991 (Ref. 65).

2.10 Heating, Ventilating, and Air Conditioning Duct and Duct Supports

The HVAC Duct and Duct Supports CAP plan addresses Employee Concerns, CAQs, and NRC violations. The deficiencies identified can be categorized as discrepancies in design basis, design output not enveloping all design parameters, installed configurations not complying with design documents, and discrepancies between installed configurations and inspection documentation.

The HVAC Duct and Duct Supports CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was submitted to the NRC on November 18, 1988 (Ref. 22). The NRC endorsed the approach by SER, dated October 24, 1989 (Ref. 66).

2.11 Instrument Lines

The Instrument Lines CAP addresses the technical issues related to instrument line functional and structural problems. The functional issue is related to the adequacy of instrument sense line slope. The structural issues are related to:

- Thermal effects on instrument lines
- Pipe and tube bending
- Compression fittings
- Installation discrepancies

The scope of the functional issue (slope) includes sense lines associated with instruments that perform a safety-related function and other selected instruments that are particularly sensitive to the effects of entrapped air in their sense lines. The scope of the structural issues includes Seismic Category I and I(L) instrument lines and their associated supports that are analytically decoupled from the process line. The term instrument line includes the following types: instrument sense, control air, instrument signal, sampling, and radiation monitoring.

The Instrument Lines CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was originally submitted to NRC on December 23, 1988 (Ref. 23). It was later revised and resubmitted to the NRC June 27, 1989 (Ref. 67). The NRC endorsed the approach by SER, dated September 8, 1989 (Ref. 68). TVA revised the FSAR (Amendment 65) to conform to the CAP, and NRC accepted that revision in SSER 6 of NUREG-0847, dated April 1991 (Ref. 56).

2.12 Prestart Test Program

The Prestart Test Program CAP plan is a test program with an objective of demonstrating, to the extent required for fuel loading, the safe operational capability of WBN unit 1. The program will validate component and system function following the completion of

current major construction and modification work. NRC concerns regarding the need for such testing were expressed in a letter to TVA (Ref. 69).

The Prestart Test Program CAP plan was submitted to NRC by letter dated December 30, 1988 (Ref. 24) and Revision 2 was submitted on June 26, 1989 (Ref. 70). The NRC endorsed the approach by SER, dated October 17, 1989 (Ref. 71).

2.13 QA Records

The QA Records CAP plan defines actions to resolve issues associated with WBN construction and operations QA records. Reviews conducted of WBN construction and operations records required for licensing found that some records (1) were not retrievable in a timely manner or were potentially missing, (2) were maintained in improper storage, or (3) had quality problems (e.g., were incomplete, technically deficient or administratively deficient).

The QA Records CAP was originally submitted to NRC on December 21, 1988 (Ref. 25). Revision 3 of the QA Records CAP plan was submitted to the NRC on June 27, 1989 (Ref. 72). The NRC endorsed the approach by SER dated December 8, 1989 (Ref. 73). As a result of trend analysis of available data performed as part of the CAP, and because of TVA and NRC concerns that the CAP did not include a comprehensive review of all record types, an expanded systematic review of WBN records was developed and submitted to NRC on January 28, 1991 (Ref. 74). This program will provide reasonable assurance that WBN records are retrievable and of adequate quality and that any deficiencies are dispositioned in accordance with NRC requirements.

The QA Records Project, which is responsible for the implementation of this CAP Plan, has been transferred from the Manager of Projects reporting to the Site Vice President to a position in the newly created Completion Assurance Organization discussed in Chapter V, Section 1.2.6. This change is intended to provide additional focus and strengthen oversight of the project.

2.14 Q-List

The Q-List CAP defines actions for developing a new WBN Q-List to correct several problems with the existing list. These problems were documented in a Site QA Audit, in several employee concerns, and in NCR report W-269-P. The major problems were:

- The Q-List did not differentiate between features with full QA Program requirements and features with augmented (limited) QA Program requirements.

- Motors and other equipment were not uniquely identified on the Q-List.

- The Q-List contained some incorrect QA classifications.

The Q-List CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. Revision 1 of the plan was submitted to the NRC on October 27, 1988 (Ref. 26). The NRC endorsed the approach by SER, dated September 11, 1989 (Ref. 75). Revision 3 was issued July 20, 1990 (Ref. 76), incorporating changes made in Revision 2, which had not been issued. Subsequently, the approach was modified, and Revision 4 was submitted to the NRC on November 7, 1990 (Ref. 77). The NRC advised TVA by letter dated January 23, 1991 (Ref. 78) that their comments, resulting from the review of Revision 4 of the CAP, do not change the evaluation published in Section 17 of SSER 5 of NUREG-0847 dated November 1990 (Ref. 79). The NRC SSER 6 of NUREG-0847 dated April 1991 (Ref. 56) documents the status of this CAP as complete.

2.15 Replacement Items Program (RIP)

The Replacement Items Program (RIP) CAP plan (also called Piece Parts) defines actions to evaluate commercial-grade items procured without NE review for safety-related applications. The WBN RIP was started in response to BFN employee concerns and NRC audit findings from SQN. The scope of the RIP covers commercial-grade replacement item procurements for safety-related applications and procurements of replacement items for 10 CFR 50.49 components.

The Replacement Items Program (RIP) CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. Revision 1 of the plan was submitted to the NRC on December 14, 1988 (Ref. 27). Revision 2 was submitted to NRC on August 7, 1989 (Ref. 80). The NRC endorsed the approach by SER, dated November 22, 1989 (Ref. 81). Subsequently, the CAP plan was revised to reinstitute the quality release program for 10 CFR 50.49 and seismically sensitive, electrically active devices and Revision 3 was sent to NRC on July 31, 1990 (Ref. 82). The NRC accepted this revision in SSER 6 of NUREG-0847, dated April 1991 (Ref. 56).

2.16 Seismic Analysis

The seismic design basis for WBN is the Modified Newmark design spectrum anchored at 0.18 g horizontal and 0.12 g vertical for the Safe Shutdown Earthquake (SSE). The Operating Basis Earthquake (OBE) is equal to one-half the SSE. The design basis spectra were confirmed to be acceptable design bases by comparison with the Site Specific Response Spectra developed in 1979. The seismic design

basis was documented in the WBN FSAR and the NRC review and acceptance was documented in the WBN SER (Ref. 5). An independent review of the seismic analysis calculations for Seismic Category I structures was initiated in September 1987 as part of the DBVP calculation activity. The seismic analysis calculations were selected for an early review to ensure that the analysis and the resulting amplified response spectra used for seismic design of structures, systems, and components are technically adequate and satisfy licensing requirements. Based on this review, certain aspects of the structural seismic analysis were identified as requiring further evaluation and justifications. In addition, an area of seismic analysis methodology was also identified from the ECP, which required additional evaluation. The concern is related to the time interval of integration used for performing seismic analyses. Also, three CAQRs identified issues related to soil properties used in seismic analyses and consideration of soil and pile interaction effects.

The Seismic Analysis CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The CAP plan was originally submitted to NRC on November 18, 1988 (Ref. 28). The plan was revised and resubmitted to the NRC on June 29, 1989 (Ref. 83). The NRC endorsed the approach by SER, dated September 7, 1989 (Ref. 84). The NRC issued Inspection Report Nos. 50-390/89-21 and 50-391/89-21, dated May 10, 1990 (Ref. 85), with three open items. All three items were closed by letter dated October 10, 1990 (Ref. 86), after review of Revision 2 of the CAP submitted to NRC on May 9, 1990 (Ref. 87).

2.17 Vendor Information

Vendor information for safety-related components has not been maintained in a complete, current, and configuration controlled manner. Specific problems include:

- Vendor requirements that have not been implemented.
- Vendor information that does not match the plant configuration.
- Vendor information that is inconsistent with related TVA-developed design input/output documents.
- Inadequate vendor document control program.
- Manuals lost or uncontrolled.
- Installations not approved by NE.

These problems have been identified through TVA's corrective action process, the ECSP, QA Audits, and NRC inspections.

The Vendor Information CAP plan addresses these issues and defines the scope, lists the root cause, and provides corrective actions to resolve past issues and prevent recurrence. The plan was submitted to the NRC on December 14, 1988 (Ref. 29). The CAP was subsequently revised and resubmitted on March 15, 1990 (Ref. 88). The NRC endorsed the approach by SER, dated September 11, 1990 (Ref. 89).

2.18 Welding

During the course of TVA work at its nuclear plants, conditions related to welding were identified that did not meet TVA licensing requirements. After assessing these conditions, TVA concluded that reviews were needed to determine the adequacy of the TVA welding program, including that at WBN. The TVA Welding Project (WP) was established as an independent group in 1985 to conduct these reviews.

The Welding CAP plan evaluates the WBN Welding Program in three phases as discussed below:

- Phase I was a programmatic assessment of the WBN Welding Program.
- Phase II was an in-depth review of the implementation of the Welding Program at WBN.
- Phase III is an evaluation, integration, and upgrading of welding related programs and procedures to ensure that future welding activities at TVA, including those at WBN, are conducted in accordance with licensing requirements.

The Welding CAP plan was originally submitted to NRC on January 13, 1989 (Ref. 30). The plan was revised and Revision 1 was submitted to the NRC by letter dated May 12, 1989 (Ref. 90). The NRC endorsed the approach in Inspection Report Nos. 50-390/89-04 and 50-391/89-04, dated August 9, 1989 (Ref. 91) and in Inspection Report Nos. 50-390/90-04 and 50-391/90-04 dated May 17, 1990 (Ref. 92). The CAP was subsequently revised on July 31, 1990 (Ref. 93), and the revisions were accepted by NRC in a letter dated March 5, 1991 (Ref. 94).

3.0 SPECIAL PROGRAMS

As stated in Section 1 of this chapter, many significant issues, which were not as broad-scoped as CAPs, or where substantial progress had already been made toward their resolution with several reports submitted to the NRC, were bounded in a number of Special Programs. These Special Programs were reviewed by the WBPT in a similar manner as the CAPs. However, because they were not as broad-scoped, or because significant progress had already been made in their implementation, these programs

were not submitted to NRC for prior endorsement of approach. For each Special Program, a background information file (BIF) was prepared by the line organization in accordance with WBPT procedures. Each BIF includes the historical background of the issue, identification of nonconforming issue, description of the condition (commitments and code compliance), objective and scope of the program, corrective action, root cause identification, and recurrence control measures. WBPT has reviewed Special Programs using the information in the BIF and information derived from discussions with the line organization.

The following subsections briefly describe the Special Programs listed below, including the identification of issues, actions taken or planned to resolve the issues, root cause identification, and recurrence control.

- Concrete Quality Program
- Containment Cooling
- Detailed Control Room Design Review
- Environmental Qualification Program
- Master Fuse List
- Mechanical Equipment Qualification
- Microbiologically Induced Corrosion
- Moderate Energy Line Break Flooding
- Radiation Monitoring System
- Soil Liquefaction
- Use-As-Is CAQs
- Other Programs

3.1 Concrete Quality Program

In 1985, employee concern IN-85-995-002 was filed stating that plant/construction procedures did not meet or address FSAR commitments regarding concrete compressive strength and frequency of sampling. The concern was investigated with the results concluding that the concern was substantiated. Specifically, the investigation concluded that: (1) the percentage of strength test results below specified strength was greater than allowed by the FSAR and TVA General Construction Specification G-2; (2) the quantity of concrete represented by most samples was generally within specification limits, however, there were a substantial number of samples found to be outside the limits; and (3) TVA commitments, specifications, and procedures did not conform to any nationally recognized code, standard, or specification.

The root causes of the above issues are identified by two categories: (1) licensing and engineering basis, and (2) implementation basis. The root cause for the licensing and engineering category was a lack of industry procedures at the time TVA was developing General Construction Specification G-2. TVA General Construction Specification G-2 predated the nuclear industry standards for concrete. The root cause for implementation category was oversight of personnel to make the necessary adjustments to mix

designs and sampling in a timely manner. Low compressive strength test results were originally evaluated on an individual basis and concrete mix adjustments were made in the field to control the average 3-day strength of the concrete. These efforts were not always effective in achieving the required strength test results.

NE, in conjunction with NC, performed a detailed review of Employee Concern IN-85-995-002 and provided a detailed response in Civil Engineering Branch (CEB) Report 86-19-C (R1). In addition, TVA formed a consulting panel to review the engineering basis with respect to industry standards and to review the proposed methods for estimating in-place concrete strength. The panel's report is included in CEB report 86-19-C (R1). Corrective actions for these specific items with respect to implementation, were covered under WBN SCR 6719, 6720, and 6721. These are summarized as follows:

- A procedure was developed to conservatively estimate in-place strength considering strength test results, use of bedding mortar, sampling frequencies, and strength gains with age. A consulting panel reviewed and agreed with the procedure. Because of the high fly ash content of TVA concrete, significant strength gains with age are realized. This, coupled with the original adequacy of most of the strength test results, limited the need for detailed engineering review to localized areas and building features. Where necessary, design calculations were reviewed, and it has been determined that the concrete is structurally adequate. TVA also performed in-place testing of the concrete by Winsor probe and coring. CEB Report 87-03 documents the results of this testing. The testing verified that the estimated in-place strengths are acceptable.

- Implementation of the program resulted in deviations from the program requirements. Approximately nine percent of the concrete has an estimated in-place strength less than the specified or design strength. Concrete design drawings for Category I structures were revised, where appropriate, to include a reference that ensures the use of proper concrete strengths in future design evaluations. An engineering evaluation has determined that the in-place concrete is of adequate strength to satisfy structural requirements. The results of this analysis are documented in CEB Report 86-19C.

Since nearly 99 percent of all structural concrete in Category I structures has already been placed, recurrence controls are limited to procedural changes associated with the documentation of the engineering evaluations. Construction Specification G-2 has been revised to clarify provisions for bedding mortar and project procedures have been revised to use the same type mix with one size smaller nominal maximum size aggregate for congested areas.

The results of the Concrete Quality Program were submitted to the NRC on April 16, 1987 (Ref. 95). The NRC accepted the conclusions in SER NUREG-1232, Volume 4, dated December 28, 1989 (Ref. 33). TVA notified the NRC of program completion by letter dated August 31, 1990 (Ref. 96).

3.2 Containment Cooling

10 CFR 50.49(e)(1) requires that, "The time-dependent temperature and pressure at the location of electrical equipment important to safety must be established for the most severe design basis accident during or following which this equipment is required to remain functional." Contrary to this requirement, during the development of the Watts Bar time-dependent environmental qualification accident temperature profile for the lower compartment, there was a failure to consider the long-term effects of a main steam line break (MSLB) inside containment for a plant going to hot standby conditions as opposed to cold shutdown. The present profile shown on drawing 47E235-42 (R2) reflects the peak temperature from an MSLB at the initiation of an accident and decreases over time until the loss of coolant accident (LOCA) curve becomes limiting. The Reactor Coolant System (RCS) was not considered as a major heat source after an MSLB because it was assumed that the post-LOCA environment represented the limiting condition for long-term temperature effects. However, when the primary system heat load, because of decay heat at hot standby conditions, is considered as a long-term heat source, the post-MSLB environment may be the most limiting in the long term. The long-term lower compartment temperature will not exceed the peak temperature experienced immediately following an MSLB, but the temperature may exceed the long-term qualification limits that have currently been established for safety-related equipment. This condition has been documented in a CAQR WBF870061, which was determined to be reportable (WBRD 50-390/87-22).

The root cause of this deficiency is a combination of two factors: (1) premature termination of the MSLB temperature profile analysis by Westinghouse, and (2) design oversight on the part of TVA when extrapolating beyond the time covered by the Westinghouse analysis. The Westinghouse analysis for an MSLB was terminated after the termination of the steam blowdown. It was believed that after steam release, the post-MSLB containment temperature profile temperature was declining due to containment spray and air return fan actuation (containment spray was not assumed to work after switchover to the containment sump). As a result, TVA reflected this in the post-MSLB profile. However, after ice bed melt-out, the decay heat emitted by the RCS pipes and pumps during hot standby results in gradually increasing temperatures in subcompartments of lower containment for ice condenser plants. The gradually increasing temperatures do not occur during long-term post-LOCA cold shutdown.

To correct this identified deficiency and to ensure the operability of equipment important to safety, TVA will take the following actions:

- The long-term temperature profile for lower containment will be determined for the duration of the design basis MSLB event using the Ice Condenser and Containment Spray Systems as the safety-grade systems for removing containment ambient heat following an MSLB.

- The Lower Compartment Cooler (LCC) units and associated ducting will be upgraded to safety grade, with the exception of the LCC coils. This upgrade will provide a fully qualified means of providing air circulation via the LCC fans and ductwork to subcompartments of lower containment to prevent hot spots from forming in these compartments.

- In order to ensure the availability of the WBN containment sump for recirculation and spray operation, a containment coatings transport evaluation will be performed to confirm that the protective coatings inside containment will not affect sump screen performance. These protective coatings have not previously been qualified to the MSLB temperatures because long-term, post-MSLB containment spray operation was not assumed.

- The components in lower containment important to safety will be qualified to the revised calculated MSLB temperature profile.

Recurrence control measures will be completed by the incorporation of decay heat into the containment temperature profile analysis. No additional recurrence control is required because TVA considers this deficiency to be an isolated incidence of design oversight during the development of the time-dependent environmental qualification accident temperature profile. The NRC endorsed the approach for the Containment Cooling Special Program by SER, dated May 21, 1991 (Ref. 97).

3.3 Detailed Control Room Design Review (DCRDR)

The DCRDR program was developed in response to the NRC requirements following the TMI-2 accident. The NRC required all licensees and applicants for an operating license to conduct a DCRDR to identify and correct human factor deficiencies in their control rooms. The guidance for conducting a DCRDR was provided in NUREG-0700 and draft NUREG-0801; additional guidance was provided in NUREG-0737 and the minimum requirements were specified in NUREG-0737, Supplement 1.

Applicants who were unable to complete the DCRDR before issuance of their operating license were required to conduct a preliminary design assessment (PDA) of the control room to identify human engineering discrepancies, and to establish a correction schedule, approved by the NRC staff. These applicants were also required to

complete a full DCRDR later. The NRC conducted an onsite review of the WBN control room from October 6 through October 10, 1980. TVA performed a PDA of the WBN control room and submitted its findings to the NRC in a report dated January 13, 1981 (Ref. 98). Discrepancies identified in both the NRC staff's onsite review and TVA's PDA were documented in the NRC staff's control room design review report received by TVA on June 1, 1981 (Ref. 99). License commitments resulting from NRC's control room design review and the PDA were made confirmatory items in Appendix D of NUREG-0847 (Ref. 5). During the DCRDR process, some original corrective actions were modified as part of the integrated, more comprehensive DCRDR corrective action plans, described in TVA's "WBN DCRDR Summary Report" (Ref. 100) dated October 2, 1987. During the week of November 14, 1988, NRC performed an in-process audit of the WBN DCRDR program. Following the NRC audit, in a letter to NRC dated March 7, 1989 (Ref. 101), TVA requested NRC to consider commitments of SER Appendix D to be superseded by the WBN DCRDR summary report and to address this request in the audit results. The WBN DCRDR addressed the man-machine interfaces of the main control room, the auxiliary control room, and the adjacent switch transfer rooms. In terms of review tasks, the scope of the WBN DCRDR was required to include identification of human engineering deficiencies and implementation of resulting corrective actions.

The DCRDR program was primarily instituted to address the lack of incorporation of human factor principles in the main and auxiliary control rooms for nuclear power plants.

The corrective actions are in two phases. The first was accomplished by the performance of the DCRDR and the transmittal of the DCRDR Summary Report to the NRC by a TVA letter (Ref. 100) dated October 1987. The NRC staff safety evaluation of DCRDR was received with their letter dated April 28, 1989 (Ref. 102). The second phase is the implementation of the corrective actions identified in the DCRDR Summary Report. The NRC endorsed the approach for the DCRDR Special Program in SSER 6 of NUREG-0847, dated April 1991 (Ref. 56).

Recurrence control includes: NE issued Human Factor Design Guides, and WBEP issued Human Factors Design Criteria. Also, the NE design change process now requires human factors to be addressed.

3.4 Environmental Qualification Program

10 CFR 50.49 requires the environmental qualification (EQ) of safety-related electrical equipment to ensure reactor coolant pressure boundary integrity, to shut down the reactor and maintain it in a safe shutdown condition, and to prevent or mitigate the consequences of accidents that could result in offsite exposures comparable to the 10 CFR Part 100 guidelines. It is further required that the evaluation of EQ be documented and maintained in auditable files.

TVA conducted a management review of the EQ programs at SQN, BFN, and WBN in July and August 1985. This review indicated that much of the qualification documentation was not fully auditable and, in some cases, the documentation available did not demonstrate full qualification.

The root cause for the failure to comply in a timely fashion with 10 CFR 50.49 requirements was a lack of management attention to the environmental qualification program. Responsibility and authority were not clearly defined and thus the level of documentation and attention to detail required for compliance was not recognized. These factors were further compounded by an organizational structure that made communication and cooperation between design and operational personnel difficult.

Subsequent to the voluntary shutdown of SQN, the WBN Environmental Qualification Project was formed with the responsibility for developing and implementing an EQ program. The WBN EQ program has issued two design output documents to satisfy 10 CFR 50.49 requirements: (1) the list of safety-related electrical equipment representing the installed configuration of the plant required to meet 10 CFR 50.49, and (2) the qualification file (EQ binders) that provides the auditable record demonstrating qualification for each item on the 10 CFR 50.49 list.

The WBN 10 CFR 50.49 EQ program documents that the ability of safety-related electrical equipment hardware installed in harsh areas has been qualified to perform its designated function in the environment to which it will be subjected during accidents. Programs and procedures have been established to ensure that qualification is maintained as future plant modifications are made.

Close coordination of the WBN EQ and the SQN EQ programs has been maintained. The SQN EQ program has been reviewed by NRC on several occasions starting in January 1986, and concluding before restart of SQN unit 2. Feedback from these reviews has been incorporated into the WBN program.

The work on EQ binders for WBN unit 1 has been substantially completed as described in the WBN EQ Summary Status Report provided to the NRC on September 30, 1986 (Ref. 103). An update to the report was submitted to the NRC on April 30, 1991 (Ref. 104). The binders have some open items which remain to be closed. These open items include technical issues such as the need for additional vendor information, environmental drawing updates, additional calculations, additional testing, etc., and open items which require additional field work such as the need for additional field verification of equipment, piece parts or whole device replacement, rerouting of cables, etc.

For the long-term EQ program, procedures have been developed to provide the controls necessary to maintain compliance with

10 CFR 50.49. These controls are to ensure that the impact of design changes on EQ documents is evaluated and input into the design output documents, and to ensure maintenance or modification work on equipment within the scope of 10 CFR 50.49 is identified and feedback provided to NE to update the associated EQ documents. These actions will ensure that the auditable files are maintained to reflect the as-constructed plant.

The actions to close the open items are being implemented in accordance with existing design change processes and procedures. Corrective actions will be completed and open items will be closed before fuel load with allowance for documenting specific exceptions for tasks which are dependent upon a particular plant mode for completion. The NRC endorsed the approach for the EQ Special Program by SER NUREG-1232, Volume 4, dated December 28, 1989 (Ref. 33).

3.5 Master Fuse List

The objectives of the Master Fuse List (MFL) program are to formulate a Master Fuse List of Class 1E fuses, resolve the misapplication of Bussman KAZ actuator devices as fuses, and resolve deficiencies involving electrical penetration assembly (EPA) overcurrent protection fuses. The MFL development will include the corrective actions taken to resolve both the use of the Bussman KAZ fuses and deficiencies with EPA fuses.

The root causes for the misapplication of the KAZ actuator devices as fuses and failure to provide proper EPA redundant overcurrent protection fuses are as follows:

- NE did not provide adequate design input at the time of the fused circuit design to require that device coordination studies be performed to ensure selectivity under fault conditions.

- NE did not provide adequate design input and output documents to detail and clarify the design process to ensure proper EPA protection fuses.

- NE did not properly coordinate and review the fuse design.

The objective of the MFL Program will be achieved by the following corrective actions:

- NE will develop and issue an MFL that will contain the following categories of Class 1E fuses:

  - Class 1E fuses used in the auxiliary power and control systems

  - Class 1E fuses used as electrical penetration protection fuses

- Class 1E fuses used in control/distribution panels
- Class 1E fuses that perform Class 1E to non-Class 1E isolation functions

- NE has issued the design output to replace the existing Bussman KAZ actuator devices.

- NE has evaluated the EPA protection fuses and performed calculations on all penetration protection fuses. Failures have been identified and any rework that is necessary to ensure adequacy of the installation is being performed in conjunction with the resolution of cable and raceway issues.

The recurrence control for the misapplication of the KAZ actuator device and for ensuring adequate EPA fuses is given below:

- Design Criteria WB-DC-30-27 has been issued and requires device coordination studies to be performed to ensure selectivity.

- NEP 3.2 has been issued to require that design input for components be identified, documented, reviewed, and approved.

- NEP 5.2 has been issued and requires design verification procedures including checklists and questions to be addressed during design verification and reviews.

These corrective actions are being implemented in accordance with existing design change processes and procedures. All corrective actions will be completed before fuel load. The NRC endorsed the approach to resolve these issues in SER NUREG-1232, Volume 4, dated December 28, 1989 (Ref. 33). However, three concerns were identified. TVA responded on July 31, 1990 (Ref. 105), and the NRC closed one of the three concerns by letter dated February 6, 1991 (Ref. 106). TVA responded to the two remaining concerns on May 31, 1991 (Ref. 107).

3.6 Mechanical Equipment Qualification

The mechanical equipment qualification (MEQ) program defines WBN actions to ensure that active mechanical equipment located in a harsh environment can perform its intended function during both normal and accident conditions. The WBN MEQ program was established in response to the NRC's letter from E. G. Adensam to H. G. Parris dated April 1, 1983 (Ref. 48). The MEQ program will ensure that active safety-related equipment conforms to the applicable requirements of 10 CFR 50 Appendix A GDC 4 and will adequately perform its safety functions when subjected to both normal and postulated conditions. The MEQ Program complements the 10 CFR 50.49 EQ Program and includes the analysis of the nonmetallic subcomponents of mechanical equipment for the effect of maximum thermal and radiation conditions. This analysis will be done on active safety-related mechanical components located in harsh environments before fuel load.

This issue developed from the NRC concern (Ref. 48) that accelerated degradations of non-metallics may occur because of postulated temperature and radiation exposure or that non-metallics of unknown type or pedigree exist in active safety-related equipment which must be evaluated for degradation.

To address this issue the MEQ program has been developed to identify and analyze affected equipment. The program provides for the review of the initial design and incorporates material and equipment modifications, maintenance review, and field verification. Analysis of components is accomplished in a recognized and established manner and closely follows the programmatic logic of the 10 CFR 50.49 environmental equipment qualification program for electrical equipment. A controlled binder will be issued which will document and maintain records of qualified equipment and establish qualification maintenance requirements. Maintenance procedures will be established to provide for material changeout to ensure that materials in use are within their qualified life.

The following describes the major emphasis of the MEQ program:

- The mechanical equipment list will establish the population of mechanical equipment within the MEQ program to be baselined.

- The documents produced by the MEQ program will be in controlled binder or manual form and will contain documents necessary to establish and maintain the prescribed equipment in a qualified status for life-of-plant.

Recurrence control is assured through the implementation of the MEQ Program at WBN. When the MEQ binders are in place, evaluation for subcomponent suitability and qualified life will be in accordance with the data contained therein.

This program will demonstrate compliance with 10 CFR 50 Appendix A GDC 4 and will technically justify the suitability of installed equipment and materials for their environmental area. The program will provide a basis for closure of existing adverse conditions, as well as discrepancies identified in the VSR.

TVA letter to the NRC dated May 19, 1983 (Ref. 109) summarized the MEQ program activities that were necessary to establish the degree of environmental qualification referred to in Ref. 108. This program is substantially complete with an identified number of open items to be resolved. Some minor parts replacement is expected. The NRC endorsed the approach for the MEQ Special Program by SER NUREG-1232, Volume 4, dated December 28, 1989 (Ref. 33).

3.7 Microbiologically Induced Corrosion (MIC)

In August 1986, a through-wall leak of approximately seven drops per minute was discovered in the 12-inch Type 316 austenitic stainless

steel essential raw cooling water (ERCW) line at WBN, which serves as a redundant supply to the motor- and turbine-driven auxiliary feedwater pumps. As a result of this unanticipated leakage, a metallurgical analysis was performed on the affected piping section to determine the cause of leakage and assess its potential effect on the remainder of the ERCW system. A detailed evaluation identified the cause of leakage as MIC at a butt weld with 316 stainless steel filler metal. This condition was documented in NCR W-471-P. SCR WBNNEB8676 (unit 1) and SCR WBNNEB8677 (unit 2) were written to assess the potential of MIC in the remainder of the ERCW system and other susceptible systems. Although this problem was identified in stainless steel piping at WBN, carbon steel raw water piping systems also are susceptible to MIC.

The root cause of this condition is that MIC-associated problems were not anticipated at the time of design, since the phenomenon of MIC was not understood. Designers were unaware of conditions that contributed to MIC colonization, therefore, design did not provide for methods of MIC control.

TVA will install a chemical treatment skid at the intake pumping station, which destroys the MIC bacteria's ability to adhere to the pipe wall. This system prohibits the initiation of new sites for MIC tubericules. To combat the buildup of corrosion products and tubericules that already exist, TVA is in the process of installing a chemical treatment system that will clean the wetted surfaces with polyphosphates and protect the cleaned surfaces with a corrosion inhibitor. A nonoxidizing biocide will also be added for the control of mollusks and long-term control of bacteria in piping where flow is low or generally stagnant.

The MIC Special Program, as summarized above, was submitted to the NRC on February 26, 1991 (Ref. 110).

3.8 Moderate Energy Line Break (MELB) Flooding

In accordance with GDC 4, TVA's WBN Design Criteria WB-DC-40-31.50, "Evaluating the Effects of a Pipe Failure Inside and Outside Containment," Section 4.4, requires evaluation of the environmental effects of moderate energy piping failures. The definition of environmental effects in WB-DC-40-31.50, revision 5, Section 2.5 includes flooding. Design criteria WB-DC-40-31.51, revision 1, "Evaluating the Effects of Flooding Due to Moderate Energy Pipe Failures Inside and Outside Containment," delineates the criteria to evaluate the consequences of flooding due to an MELB.

TVA determined that there was inadequate documentation for WBN to conclude that there will be no unacceptable consequences as a result of flooding in a Category I structure, outside containment, following moderate energy pipe failures. As such, it could not be

shown that the requirements of WB-DC-40-31.50 have been met for affected equipment or structures. This condition, which was determined to be reportable (WBRD 50-390/85-59), has been documented in SCR WBNNEB8523.

The root cause of this deficiency is the failure to properly assign and track this task within the responsible engineering organization. This occurrence is considered to be an isolated design oversight.

As corrective action, including implementation of necessary plant upgrades, TVA will perform a documented evaluation of the effects of flooding due to moderate energy pipe failures outside containment in Category I structures. This will verify that essential elements and structures are either unaffected by postulated flooding, or are designed, specified, and/or qualified for the environment caused by such flooding. The majority of the pipe break analyses, including break locations, flooding levels, and equipment qualification evaluation, have been completed. The remaining corrective actions for the MELB include verification of assumptions associated with the MELB pipe break evaluation and implementation of necessary plant upgrades.

Recurrence control was accomplished by instructing responsible engineers to ensure that all identified tasks are properly assigned and tracked.

These corrective actions are being implemented in accordance with existing design change processes and procedures. Corrective actions will be completed before fuel load. The NRC accepted the approach for the MELB Special Program in SER NUREG-1232, Volume 4, dated December 28, 1989 (Ref. 33).

3.9 Radiation Monitoring System

The Radiation Monitoring System (RMS) program was developed to ensure a programmatic corrective action for numerous individual adverse conditions associated with RMS design, documentation, installation, and hardware. The collective evaluation of the identified problems resulted in a need to correct or establish confirmation of appropriate design documentation as well as to verify suitability of the equipment installations and applications. The CAQRs that identified some of these problems were WBNEEB8724 and WBP880409 (W-390-P). They were initiated to document the conditions and to control associated corrective actions. These were determined to be reportable under 10 CFR 50.55(e) and are being tracked under W-390-P for reporting (Ref. 111).

At this point in the program, it has been determined that the primary cause of the deficiencies has been the lack of definitive design basis requirements, as well as the failure to provide consistent and accurate design output documents.

Corrective actions for the outstanding CAQRs include:

- Revision of WBN RMS Design Criteria WB-DC-40-24 to establish current design basis for the RMS and associated instruments including applicable requirements of revision 2 to Regulatory Guide 1.97, Post Accident Monitoring.

- Evaluation of current RMS design, documentation, and installations against the updated design criteria to verify acceptability of the current installations or to identify required modifications for those monitors included in the technical specifications.

- Modification or reworking of existing installations and correcting documentation as necessary to correct deficiencies for those monitors included in the technical specifications.

Recurrence control includes providing updated and procedurally controlled RMS design criteria to establish the overall system requirements.

3.10 Soil Liquefaction

The potential for soils to liquefy has been a design consideration at WBN since the early stages of plant design. The evaluation of this potential is discussed in FSAR Section 2.5.4.8. Specific plant areas for liquefaction evaluation are: intake channel, and ERCW piping and Class 1E conduits. In 1985, a number of employee concerns were expressed regarding the design and construction of soil liquefaction mitigation measures that had been implemented on the west side of the intake pumping station.

The concerns were classified into three categories:

- Use of an alternative material.

- Incomplete excavation of potentially liquefiable material.

- Leakage between the Intake Pumping Station and Trench B.

The employee concerns categorized above were investigated by TVA. The investigation was documented in a joint NE/NC report.

The results of TVA's investigation for the three categories of concerns are summarized below:

- The employee concerns stated that the use of crushed stone (type 1075) was neither authorized nor documented in the FSAR, was not subjected to appropriate in-place density tests, and was used as a construction expedient. The NE/NC investigation concluded that the substitution of crushed stone (type 1075) was a reasonable alternative to compacted earthfill. It, in fact,

was an improved substitution that was authorized, not by informal means, but by design documents. Conducting in-place density tests for this type of material is impractical because the coarseness of the material causes in-place density test results to be generally erratic and unreliable. Adequate compaction was assured by the use of performance criteria (specification), which is an acceptable method of obtaining the desired level of compaction.

- The employee concerns stated that excavation between Trench B and the backfills for the Intake Pumping Station did not totally remove all potentially liquefiable soils. The NE/NC investigation determined that the design documents adequately described the excavation; a visual inspection performed by the principal design engineer when the barrier was being excavated confirmed its adequacy.

- The employee concerns stated that because the stability of surface and subsurface materials had not been evaluated, a leakage area might have a detrimental effect. Although the source of the leakage has not been defined with any precision, a monitoring program, which is designed to pinpoint the source, has been initiated. Potential man-made sources include the condenser circulating water (CCW) blowdown line and the yard holding pond. The seepage flow has been quantified to be on the order of 75 gpm, but is intermittent, and except for some surface erosion (approximately 6 inches) of topsoil, damage is negligible. Because of the above, it has been concluded that the small seepage is not leaching any material, either sand or earth, out of Trench B, nor is it causing any further erosion of the surface.

Subsequent to the investigation performed by TVA to address the above concerns, TVA engaged two prominent consultants to review its findings. Both R. L. Cloud Associates and Professor H. Bolton Seed reviewed elements of the TVA investigations and concurred with TVA's reasoning and conclusions.

Based on the investigations into the expressed employee concerns conducted by TVA and the consultants, it is concluded that the three categories of concern that involve use of alternative materials, extent of excavation, and leakage do not have a detrimental effect on liquefaction mitigation measures at WBN. However, the following actions have been implemented:

- A monitoring program to identify the man-made leakage sources (walkdown procedure WP-31) and to monitor the leakage.

- Watts Bar FSAR Section 2.5 was revised to incorporate the underground barrier "as-built" information by FSAR Amendment 63.

The NRC endorsed the approach for the Soil Liquefaction Special Program by SER NUREG-1232, Volume 4, dated December 28, 1989 (Ref. 33), subject to inspection of TVA's actions. Final inspection accepting the completion of this program was reported in Audit Report TAC No. R00514, dated October 10, 1990 (Ref. 112).

3.11 Use-As-Is CAQs

In September 1986, NE EA conducted an audit of WBEP activities related to the handling of construction NCRs. Audit deficiency 86-27-01 identified concerns regarding the control of "Use-as-is" and "Repair" dispositions. In summary, these concerns were:

- "Use-as-is" and "Repair" dispositioned NCRs were not tracked against the affected documents.
- ASME Code related "Use-as-is" NCRs had been dispositioned as not requiring a drawing change. These NCRs do not meet ASME Code requirements since the drawing was not changed nor was the NCR made readily retrievable in conjunction with the drawing.
- Many "Use-as-is" dispositioned NCRs either did not have any engineering justification or lacked adequate justification detail.
- There does not appear to be any engineering project procedure for the handling of NCRs which could have provided guidance for use-as-is disposition.

As a result of this audit deficiency, WBEP issued SCR WBNWBP8601, which was reported to the NRC under 10 CFR 50.55(e).

The root cause of this deficiency is attributable to the fact that requirements for documenting Engineering's final disposition of "Use-as-is," or "Repair" for CAQs was not specified in a project procedure or in a division-level procedure. The level of documentation for the technical evaluation, review, approval, and the configuration resulting from CAQs approved by NE as "Use-As-Is" or "Repair" did not meet all requirements of American National Standards Institute (ANSI) N45.2-1971, as committed in TVA's Quality Assurance Topical Report (Ref. 113).

TVA's corrective action plan completed the following actions:

- Identified the WBN CAQs that had a final disposition of either "Use-as-is" or "Repair," with a disposition date before April 1, 1987.
- For the CAQs so identified, identified those that had no design drawings or document issued as a result of the final disposition being "Use-as-is" or "Repair."

- Identified the applicable design documents, if any, that contain the design requirements that were not met as described by the CAQ.

- For each design document identified in the third step above, a technical review of the latest revision of the document was performed to consider the effect the condition described by the CAQ had on the document. A calculation was either prepared or revised where required, to technically justify the current revision of the document. There were no cumulative effects on technical adequacy, design margin, conformance to criteria, or FSAR commitments. The document was processed using existing design change control requirements to reflect the as-constructed configuration represented by the CAQ.

- Issued a matrix that cross-references the CAQs identified in the second step and the affected documents that were revised to incorporate the CAQs.

- Cross-referenced the matrix with each CAQ listed on that matrix in the Records Information Management System (RIMS) data base.

To prevent recurrence, WBEP-EP 43.23 was issued in January 1987 to establish the requirements for handling CAQs that are either initiated within NE or sent to WBEP for disposition by organizations outside NE. The procedure was superseded in March 1987 by WBEP 3.05. WBEP 3.05 was deactivated in May 1989 and has been replaced by AI 2.8.15 and AI 2.32. A specific requirement is included to ensure that appropriate design documents reflect the approved configuration for any "Repair" or "Accept-as-is" dispositions. These procedures also require the basis for approval of "Repair" or "Accept-as-is" dispositions to be documented along with the disposition on the CAQ report. NEP 9.1, "Corrective Action," has identified requirements for NE approval of "Repair" or "Use-as-is" dispositions of CAQs since February 1987.

The final report (Ref. 114) was submitted to the NRC by letter dated September 14, 1988. The Use-As-Is Program was accepted by the NRC in SER NUREG-1232, Volume 4, (Ref. 33). During NRC Inspection No. 50-390/90-19, the Use-as-Is program was reviewed to determine the current status and provide an initial assessment of the program implementation. The review concluded that WBN had performed adequate reviews, processed the CAQs in accordance with AI-2.8.15, initiated adequate corrective actions, and provided technical justification for "accept-as-is" dispositions. Program closure will be completed before fuel load.

3.12 Other Programs

The initial listing of 26 programs to be evaluated was included in the WBPP Table 2-1 (Ref. 11). Subsequent to the WBPP presentation to NRC on June 7, 1988, an additional program (QA/QC Records) was added, making the total number of programs 27. These 27 programs

and their coverage are listed in Table III-1. The WBPT and line organization evaluation of the programs listed in Table III-1 resulted in the identification of CAPs and Special Programs for the topics described above in this chapter. The following topics from Table III-1 have not been addressed in this WBNPP for the reasons as given below.

3.12.1 Containment Isolation

A CAP on containment isolation was submitted to NRC on October 20, 1988 (Ref. 31) to provide an approach to meet the Standard Review Plan 6.2.4 requirements for a Closed System Outside Containment (CSOC). Based on review of NRC letters dated February 15, 1989 and March 15, 1989 (Refs. 117 and 118) and consideration of the NRC staff positions expressed in teleconferences on February 14, February 17, and April 10, 1989 (Refs. 119, 120, and 121), TVA reexamined the need for a Containment Isolation CAP. TVA agrees with the NRC staff position that a single inboard isolation valve (meeting the requirements of General Design Criteria (GDC) 55 or 56) is at least as conservative as a single outboard isolation valve for use in conjunction with a CSOC. Because WBN CSOC design meets the intent of GDC 55 and 56 and SRP 6.2.4, II.6.e, TVA has decided to retain the CSOCs. Therefore, the Containment Isolation CAP was withdrawn by letter to NRC on May 12, 1989 (Ref. 122).

3.12.2 Specification Improvement Program (SIP)

Initially, the SIP was conceived to replace TVA General Construction Specifications (G Specs and N Specs) and the Nuclear Power Division Procedure Manuals (DPMs) with new corporate Master Specifications (M Specs) and site-specific Engineering Requirements Specifications (ER Specs). As SIP progressed, TVA determined that it would be more cost effective and less disruptive to improve the original specifications and issue any new specifications in the original TVA G Spec/N Spec specification format. The G Specs and DPMs were combined where appropriate and the M Specs and ER Specs that had already been issued were incorporated into the appropriate G Specs and site-specific N Specs. This initial effort was completed for WBN in April 1991. Further revisions to the specifications are determined as an evaluation of each of the identified issues demonstrates a need for specification improvement.

3.12.3 Unit 1/Unit 2 Interface

The Unit 1/Unit 2 interface program is a normal prestart activity for starting the first unit of a two-unit plant, and therefore not appropriate to be included in this WBNPP.

3.12.4 NUREG-0612, Control of Heavy Loads

A review of compliance with the requirements of NUREG-0612 has been performed and procedures are in place to ensure that all changes to the plant (DCN and ECN modification packages) are reviewed or being reviewed for adverse impact with respect to NUREG-0612. It was determined that this program was being adequately addressed through the existing line organization activities and Special Program description in this WBNPP was not warranted.

4.0 OTHER CORRECTIVE ACTIONS

As discussed in Section 1, the broad-scope, generic, and programmatic issues were consolidated in CAP plans. Several other significant issues are handled by Special Programs. In addition to CAPs and Special Programs, many of the identified issues are addressed through WBN site procedures for corrective action that implements the TVA Nuclear Power unified program of corrective action for ensuring that adverse conditions are promptly identified, documented, evaluated, corrected, tracked, trended, and reported to management in a manner consistent with their importance to safety, and that, when appropriate, actions are taken to prevent their recurrence. The corrective action process, which is a key element of the TVA Nuclear QA Program, has been and continues to be improved considerably to require the direct involvement of Nuclear Power management in assuring that timely and effective actions are taken to correct problems and prevent their recurrence. The corrective action process is discussed in detail in Section 2.4 of Chapter V.

4

IV. IMPLEMENTATION, VERIFICATION, AND CLOSURE OF CORRECTIVE ACTIONS

1.0 INTRODUCTION

WBN assessment activities described in Chapter II have resulted in the identification of corrective actions necessary to bring the design and construction of the plant into compliance with licensing requirements and TVA commitments. Assurance of the effective completion of these corrective actions will be an essential consideration in the determination of WBN's readiness for licensing. This section describes the systematic approach that will be applied to the completion of corrective actions associated with CAP plans and Special Programs discussed in Chapter III, VSR discrepancy reports discussed in Chapter II, Section 6, and employee concerns discussed in Chapter II, Section 2.4.

Other corrective actions of lesser breadth or significance will continue to be administered under the TVA Corrective Action Program as discussed in Chapter V, Section 2.4.

2.0 CORRECTIVE ACTION PROGRAM PLANS AND SPECIAL PROGRAMS

2.1 Implementation

A Project Manager has been assigned single-point responsibility and accountability for managing the implementation of each CAP and Special Program. In performing project management responsibilities, the Project Manager reports to a Senior Project Manager, who reports to the Manager of Projects, who reports to the Engineering and Modifications Manager. The Project Manager directs project activities to assure they are accomplished in compliance with standard technical and administrative requirements. The Project Manager is responsible for development of special procedures, when needed. Special procedures of a technical nature are reviewed and approved as QA Program procedures.

CAPs and Special Programs will be managed within the Site Integrated Schedule (SIS) (see Chapter V, Section 1.2.1.5). This ensures that the work activities of the performing organizations are identified, tied to each other and to plant milestones, tracked, and closed. This includes design, construction, and verification interfaces within the project as well as interfaces with other CAPs and Special Programs. The Project Manager ensures that consistency is maintained between CAP and Special Program corrective actions and those defined in other corrective action documents or committed to in response to employee concerns, NRC findings, and VSR discrepancies. Proposed changes to the corrective actions of the CAPs, Special Programs, or the other corrective action documents, employee concerns, NRC findings, and VSR discrepancies that form

their basis will be controlled by site instructions. These site instructions define responsibility and authority for change approval and include requirements for appropriate licensing commitment revisions.

2.2 Verification

Site QA will provide independent verification of CAP and Special Program activities. This will be done as part of the integrated QA verification process discussed in Section 5. The program description, implementing procedures, and work activities of each program will be verified. This will provide ongoing assessment of organizational performance and product quality.

2.3 Closure

A final report will be issued providing the basis for closure of each CAP or Special Program. The report will include conclusions regarding the extent of program implementation, the closure of items that were the basis of the program, program revisions, and the accomplishment of program objectives.

3.0 VERTICAL SLICE REVIEW

3.1 Implementation

The TVA responses (RRs) to the DRs were used by the VSRT to draw conclusions regarding the adequacy of corrective actions. While RRs provided an effective mechanism for resolving issues with VSRT and WBPT, they are not part of the TVA Corrective Action Program. Therefore, corrective action documents referenced by RRs have been initiated or revised to identify the DRs they will resolve. This will ensure that corrective actions for VSR discrepancies are administered in the TVA Corrective Action Program.

Because of the importance of VSR conclusions to the licensability of WBN, VSR corrective actions will be provided with supplemental controls in addition to TVA Corrective Action Program controls. Site instructions provide the following controls for tracking and implementing VSR corrective actions. Controls for verification and closure are discussed below in Section 3.2.

Supplemental tracking of the DR closure will be provided in addition to the routine Corrective Action Program tracking. Incomplete corrective actions have been coded so as to be readily identifiable as commitments related to the VSR. These incomplete corrective actions are tracked to completion as part of the TROI system.

It may be necessary during implementation of the corrective action that something such as methodology or scope must be revised. Upon completion of the corrective actions associated with a DR, the organization responsible for resolving the DR with the VSRT reviews the completed corrective actions and the original commitments in the RR and CR to determine whether or not they have been fulfilled. Any reduction of commitment to VSR corrective actions requires the review and concurrence of Site QA and must be approved by both the Site Vice President and the Vice President, Nuclear Projects.

The VSR Final Report made several recommendations for which implementation plans were prepared by the line organization and reviewed for acceptance by the WBPT.

3.2 Verification and Closure

To assure the fulfillment of commitments made in resolving the VSR DRs, the site procedure which controlled the actions of the line organization in resolving the DRs was revised to provide stringent requirements for closure of DR and VSR findings. This procedure requires that the corrective actions for each DR be listed on a VSR Closure Form (Appendix I of WBN procedure AI-11.3).

A final closure report for the full scope of the VSR will be prepared by the Manager of Projects at the completion of all DR closure reports. The report will include conclusions regarding the extent of corrective action implementation. Verification of the implementation of the VSR recommendations will also be discussed in this report.

4.0 CONCERNS RESOLUTION

4.1 Implementation

The ECSP resulted in WBN corrective actions, which are being administered under Corrective Action Tracking Documents (CATDs). These corrective actions constitute TVA's commitments under the ECSP.

As a result of physical and/or procedural changes at WBN since the corrective actions were identified, changes to the corrective actions may be required. Changes are made through modifications of the CATDs in accordance with approved procedures. The NRC has found this process acceptable by SER dated April 15, 1991 (Ref. 123).

Each CATD or portion thereof will be dispositioned to support the completion and startup of unit 1. Any action remaining will be brought to completion either through the CATD process or other approved corrective action processes.

4.2 Verification and Closure

When the responsible organization completes the corrective action for CATDs, it provides objective evidence of completion to the Concerns Resolution Staff (CRS). The corrective action is independently verified by QA and overseen by the CRS to ensure that the corrective action plan was properly implemented and that the original employee concerns were dispositioned.

Corrective actions completed as a result of the CRS investigations are verified and closed by the CRS.

5.0 QUALITY VERIFICATION PROCESS

Site Quality Assurance will perform verification to ensure that quality-affecting activities at WBN are properly carried out. The QA verification process described below will provide a systematic approach to the conduct of these activities.

The verification activities performed will focus on the following three program areas: program objectives and goals; procedures that implement the program; and the actual work activity of the implementing procedure. The verification activities include reviewing, inspection, monitoring, and auditing. The monitoring and inspection activities are concentrated in the implementation phase, with the audit activities concentrated in the program area. Review activities are performed on both program and implementation documents. Emphasis will be placed upon the verification of the implementation process through activities such as performance-based audits, real-time performance-based monitoring, and in-line inspections and reviews. This will result in planned overlap of verification activities in the implementation phase of quality activities. The results of verification processes will be used for an assessment of organizational performance and product quality.

The following additional factors will be considered in deciding upon the degree of QA verification necessary to ensure effective implementation of specific activities:

- New activities not previously performed or implemented.
- Trend or previous histories of quality problems.

Coordination of the verification activities is performed by the Integrated Verification Plan (IVP). The IVP is a systematic and planned application of reviews, monitoring, audits, and inspections of WBN

quality-affecting activities categorized in Table IV-1. The IVP process is directed by the Site Quality Manager. Verification activities for each IVP category are planned and performed periodically in conjunction with the site planning schedule. Verification activities, where appropriate, will focus on in-process or completed CAPs and Special Program activities.

As an enhancement to the IVP, a specific verification plan for each of the CAPs and Special Programs has been developed to identify the primary quality activities requiring verification and final closure. Quality Assurance specialists have been assigned to the CAPs/Special Programs to assure that the primary activities and commitments are carried out properly as directed by each verification plan. Verification of these activities will be performed and documented in accordance with the verification plans by the following methods:

- Reviews, audits, monitoring, and inspections through the IVP.
- Reviews by other organizations such as independent verifications by engineering contractors or assessments by corporate staff specialists.
- Oversight and monitoring by the assigned QA specialists.
- Reviews by specialists (selected by QA) with expertise in the specific technical area.

Feedback will be used to adjust the verification process and the program. At each stage of the verification process, the results are reviewed and used to adjust the verification methods as well as to provide feedback to the implementing line organization to correct deficiencies in the verification process. Program elements will allow for increasing or decreasing the verification activities, including changing emphasis to different types of verifications, depending on the feedback from the results obtained. Deficiencies found during the verification processes will be corrected before closure.

Where appropriate, an interim assessment will be performed at approximately the 75-percent completion level of CAPs and Special Programs by the assigned QA specialist. The results of audits, reviews, monitoring, and inspections completed at that time will be assessed. Additional verifications will be performed where necessary to assess the quality of activities reported complete. This interim assessment will (1) determine the quality of the completed activities; (2) determine the quality and effectiveness of the design and work control processes for the remaining work; (3) identify open issues; (4) identify open commitments; and (5) determine the final verifications needed to ensure adequate closure of the CAP or Special Program.

Closure of a specific corrective action program is dependent upon acceptable results from the verification processes. The overall verification process includes quality assessment of specific programs, collective assessment of all programs, and assessment of the readiness for fuel load.

In this manner, the verification process will lead to a successfully implemented corrective action program that can be closed with a high level of confidence in the program results. This verification process will follow each step of the process for ensuring final product quality, rather than verifying only the final product to evaluate quality.

TABLE IV-1

IVP CATEGORIES OF
QUALITY-AFFECTING ACTIVITIES

Operations	Fire Protection
Licensing	Procurement
Maintenance	Training and Qualification
Modifications	Management Controls
Radiation Protection	Chemistry
Installation, Inspection, and Testing	Effluent Monitoring/Radwaste Management
Emergency Preparedness	Engineering Design
Security and Safeguards	Other (as needed)

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V. WATTS BAR MANAGEMENT AND ORGANIZATION

1.0 STRENGTHENING WBN MANAGEMENT AND ORGANIZATION

The CNPP describes the TVA Nuclear Power organization that corrects identified weaknesses in corporate support activities. The WBN organization has been restructured to be consistent with the overall Nuclear Power organization (See Figure V-1). These organizational changes have strengthened corporate support and achieved consistency between corporate and site functions. This chapter describes the restructuring of WBN organizations and programs necessary to support completion of the project and operation of the plant.

In a number of areas, WBN managers and their organizations lacked clear assignment of responsibility and authority. Accordingly, efforts have been made to clarify each manager's area of responsibility, establish accountability, and assure adequate resources to perform assignments.

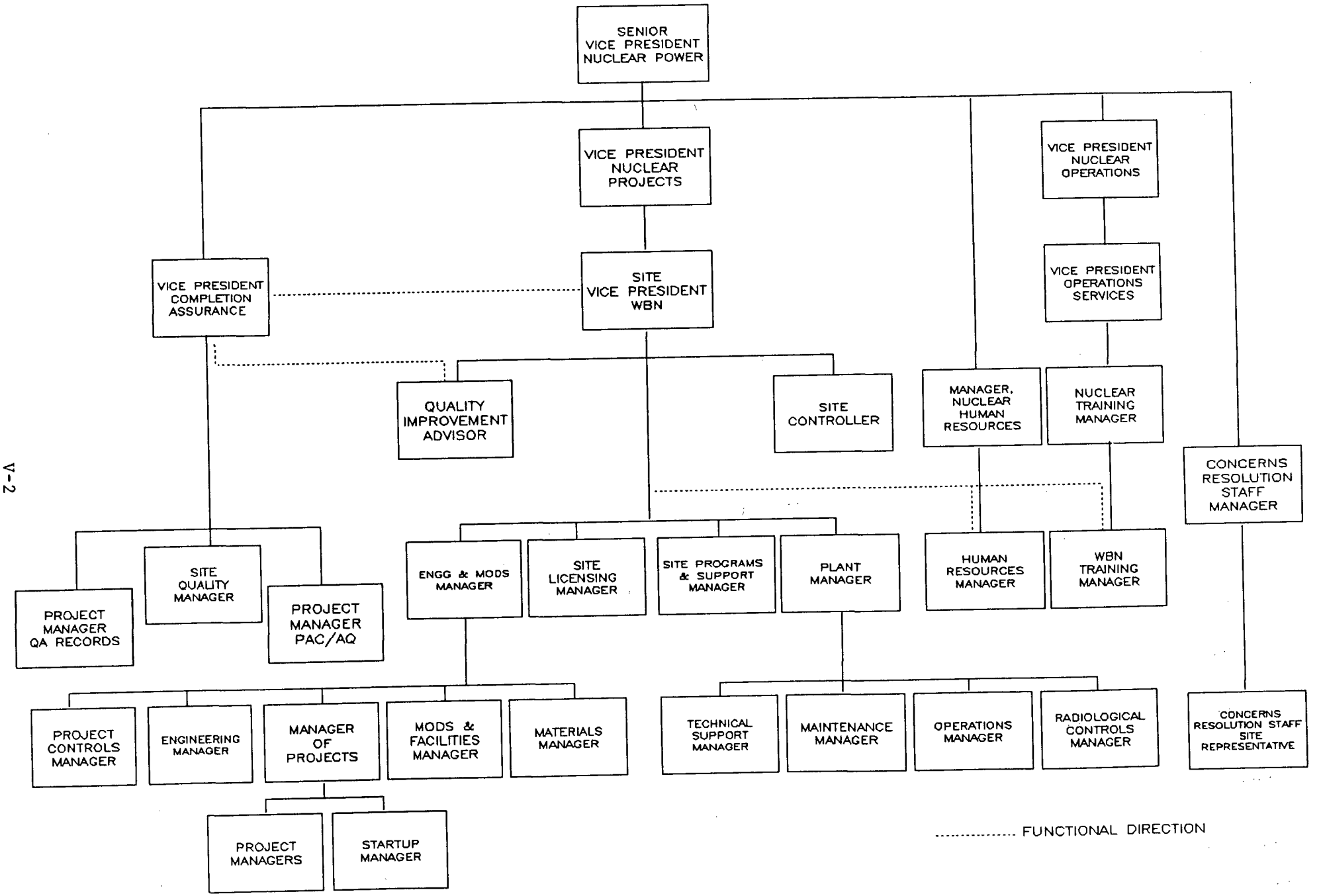
Managers and supervisors in some WBN positions did not have the desired level of plant knowledge. As a result, TVA is also continuing efforts to improve the level of plant operations and systems understanding among line managers and supervisors.

By letter dated April 5, 1991 (Ref. 124), TVA notified NRC of its completion of all but one of the corporate commitments described in the CNPP, and stated TVA's intent to maintain the CNPP as a historical document without further updates. TVA has also submitted Topical Report TVA-NPOD89-A (Ref. 3), which describes TVA's Nuclear Power corporate organization, as well as the organization for its nuclear plant sites including WBN. TVA stated that it would remove organizational descriptions from the licensing documents and reference the topical report. By letter dated June 26, 1991 (Ref. 4), NRC concluded that it was acceptable to reference this topical report with respect to the organization and staffing for, among other things, the operation of WBN. Notwithstanding this understanding, this revision to the WBNPP contains a detailed discussion of the WBN organization to describe TVA's management and organizational plan for successfully completing WBN.

1.1 Strengthening Functional Support

In order to further enhance management involvement and project control, in August and September 1990 the Senior Vice President, Nuclear Power, established the positions of Vice President, Nuclear Projects and Vice President, Watts Bar Site, and in July 1991, the position of Vice President, Completion Assurance.

The Vice President, Nuclear Projects, who reports to the Senior Vice President, Nuclear Power, has overall responsibility for construction, engineering, startup testing, and plant operations required to support the completion and startup of WBN.



WATTS BAR ORGANIZATION
FIGURE V-1

Revision 1

The Vice President, Completion Assurance, who reports directly to the Senior Vice President, Nuclear Power, will provide single-point accountabililty and focus for all oversight efforts for the plants under construction (BLN and WBN). For WBN, the Vice President, Completion Assurance, receives project direction from the Site Vice President in the Site Quality, PAC/AQ, and QA Records areas.

The WBN Site Vice President, who reports to the Vice President Nuclear Projects, is responsible for planning, scheduling, coordinating, and providing project direction for the activities of the site support organizations.

WBN nuclear site support organizations have been reorganized into functional departments that generally parallel the functional departments in TVA's nuclear headquarters. Where applicable, each site support organization receives technical direction from its respective corporate department.

The WBN Site Vice President approves and controls activities conducted on site. The Site Vice President has the authority and responsibility for staffing the organization and ensuring the safe, economical, and efficient operation, maintenance, and modification of the facility within the policies and guidelines established by the Senior Vice President, Nuclear Power. The Site Vice President also directs the activities of the site to ensure that the plant is in compliance with licensing requirements, TVA policies and directives, QA requirements, and applicable local and state requirements. The Site Vice President develops and implements site programs to ensure the performance and documentation of site activities in accordance with established quality program requirements and policies.

The managers who report directly to the Site Vice President are the Engineering and Modifications Manager, Site Licensing Manager, Plant Manager, Site Controller, Site Programs and Support Manager, and Quality Improvement Advisor. The managers who receive project or functional direction from the Site Vice President are the Vice President, Completion Assurance, for the Site Quality, PAC/AQ, and QA Records functions of WBN; the Site Training Manager; and the Human Resources Manager.

1.2 Specific Organizational and Management Improvements

This section discusses the responsibilities of WBN organizations and key positions.

1.2.1 Engineering and Modifications Manager

The Engineering and Modifications Manager, who reports directly to the Site Vice President, is responsible for integrated management and execution of site projects from start to finish. This includes providing overall management of engineering and modification functions, ensuring that managed activities are conducted in accordance with applicable regulations and TVA policies and procedures and in a manner that will maintain the technical integrity of TVA facilities. Reporting to the Engineering and Modifications Manager are the Engineering Manager, Modifications and Facilities Manager, Materials Manager, Manager of Projects, and Project Controls Manager.

1.2.1.1 Project Management

Major site projects benefit from additional control and coordination of functional activities, particularly when numerous task or organizational interfaces are involved. Therefore, individual Project Managers are selected and assigned to major projects. This will ensure more management attention to these projects and provide a single point of accountability for project performance.

The Project Manager is responsible for directing project activities to ensure compliance with technical and administrative requirements.

The Project Manager ensures the appropriate development of work scope and obtains the necessary information needed for project definition. The Project Manager works closely with Engineering, Modifications, Licensing, QA, Operations, and other support organizations to ensure a clear, detailed statement of the issues to be resolved and commitments to be met for each project.

The Project Manager is also responsible for periodic project reporting, as well as for escalating any unresolved problems that could affect successful completion of the project to higher management for resolution. Project Managers report to a Senior Project Manager, who reports to the Manager of Projects, who reports directly to the Engineering and Modifications Manager.

Due to the extent of plant modifications since original conduct of systems preoperational testing, the Startup and Test Organization will implement an additional test program. The Startup and Test Manager will address the requirements of the Prestart CAP and will include testing for some systems outside the scope of the CAP. In order to implement the Startup Test Program, selected systems, including accident-mitigating safety systems, will be turned over from

the Plant Manager to the Startup and Test Manager for jurisdictional control. The Startup and Test Manager will direct the control of work and testing on turned over systems in accordance with the WBN Startup Manual until systems turnover back to the Plant Manager.

The Startup and Test Manager reports to the Manager of Projects. He manages the Startup and Test Group and chairs the Joint Test Group (JTG). The Startup and Test Group consists of Component Test Sections, Acceptance Test Sections, Milestone Managers, Walkdown Coordinators, and a Startup Scheduling and Punchlist Section. The Milestone Managers, with support from the Scheduling and Punchlist Manager, will conduct daily Startup meetings to ensure plant activities are prioritized and conducted to support testing and operations turnover logic in accordance with the site schedule.

1.2.1.2 Engineering

In the past, problems had developed with respect to TVA's nuclear engineering activities since both the headquarters nuclear engineering organization and TVA's nuclear plant organizations performed engineering activities. These problems have been or are being addressed through organizational changes, program changes, and baselining of the plant configuration.

As discussed in Chapter IV of the CNPP, the TVA organization has been strengthened through the consolidation of engineering activities in NE. The responsibility for engineering for WBN has been assigned to the Watts Bar Engineering Project (WBEP) under the direction of the Engineering Manager (EM). The WBEP was relocated to the plant site in 1986. The Project Engineer (PE), Design Engineering Manager, Operational Engineering Manager, Engineering Support Manager, and the Senior Site Manager of the Engineering Contractors organization report to the Engineering Manager.

The PE is responsible for controlling WBN engineering-related activities, providing contractor management, interfacing with project management, and coordinating technical review.

The Design Engineering Manager (DEM) is responsible for the civil, mechanical, and electrical disciplines; field support; and the procurement engineering group. The Operational Engineering Manager is responsible for materials and chemistry, safety analysis, and nuclear experience review. The Engineering Support Manager is responsible for special projects, project controls, design control, and drafting.

The Senior Site Manager of the Engineering Contractors organization is responsible for managing the work assigned by TVA to the engineering contractor.

These changes have been implemented to provide a clear WBN focus for NE and to develop clear lines of responsibility and accountability. WBN work to be performed under the control of the EM includes: calculations, engineering support for licensing, design systems engineering, technical requirements for procurement, and handling of design-related adverse conditions.

The EM has direct and close control over the work produced for WBN and ensures that technical direction provided by the discipline departments is followed for WBN work. The principal focus of TVA engineering is maintaining the design and licensing basis of the plant by maintaining ownership of design criteria, FSAR, NRC commitments, essential calculations, and other key design basis documents. The engineering contractor's principal focus is assigned engineering and detailed production design. The Manager, Corporate Engineering ensures that discipline technical direction is properly implemented in WBN activities.

Responsibilities that have been consolidated within NE include:

- Maintaining the technical record of the as-built facility and maintaining the record current with changes in the plant.
- Designating a representative to participate as a member of the Plant Operations Review Committee (PORC).
- Directing multidiscipline engineering teams created to investigate and resolve engineering issues (such as fire protection and environmental equipment qualification) associated with the plant.
- Determining and dispositioning corrective actions for design-related adverse conditions.
- Preparing and issuing design change packages that modify the design and configuration of the plant.
- Managing engineering service contracts.
- Providing operational support.

Program changes to strengthen the design control process are discussed in Section 2.7.

Baselining of the plant configuration is being accomplished through the DBVP as discussed in Chapter III, Section 2.3.

1.2.1.3 Modifications and Facilities (M/F)

The Manager, Modifications and Facilities, is responsible for the implementation of all plant modifications in accordance with approved design documents and applicable requirements. Reporting to the Manager, Modifications and Facilities, are the Field Project Engineering Manager, Shift Field Manager, Support Services Manager, Special Projects Manager, and Facilities Manager.

The Field Project Engineering Manager is responsible for managing all aspects of engineering support in the areas of work planning and work plan development, field engineering support, material procurement, welding engineering, procedure instruction development, and maintenance request planning.

The Shift Field Manager is responsible for managing a multi-discipline TVA and contractor organization and support personnel engaged in work activities to ensure that work is completed on schedule and within budget.

The Support Services Manager is responsible for providing project controls, material coordination, operations/work control liason, and administrative services to the modifications organization.

The Special Projects Manager is responsible for managing the backlogged and corrective action programs, and is also responsible for managing the administrative support activities.

The Facilities Manager is responsible for managing the construction and maintenance of site facilities not directly associated with plant system operation.

In addition to this action, the following management steps have been taken to enhance the completion of WBN unit 1:

- Construction on unit 2 has been delayed and emphasis is being directed toward obtaining an operating license for unit 1.

- Work is planned thoroughly before it is allowed to commence. The implementation workplan, which is developed by M/F, is reviewed by involved organizations and the Site Quality Manager's organization to ensure that technical,

administrative, and quality requirements are appropriately addressed.

- The physical work will be performed by a contractor who will provide skilled craftsmen and supervision to ensure that quality work is performed in a safe and efficient manner within established schedules.

- M/F supports the Design Change Process outlined in Section 2.7 of this chapter by participating with NE in a constructibility walkdown to provide a greater degree of assurance that the design issued can be installed.

- The establishment of the NE Project Engineering organization at the site has alleviated previous interface problems between NE and M/F. This has allowed NE personnel to be involved with M/F personnel on a daily basis to help resolve field installation problems. NE and M/F can more easily hold coordination meetings and perform constructibility walkdowns during the course of the modification process to identify any potential installation problems.

1.2.1.4 Materials

The Materials Manager is responsible for the preparation and handling of procurement documents, which are taken from engineering output; expediting and tracking of materials; warehousing operations, which include material receipt, storage, and control; providing traceability during storage; and issuing materials to site requesters. The Materials Manager reports to the WBN Engineering and Modifications Manager.

Reporting to the Materials Manager are the Nuclear Procurement Manager, the Nuclear Stores Manager, and the Material Planning and Coordination Manager.

The Nuclear Procurement Manager is responsible for managing the processing of site procurement documents, coordinating purchase of inventory and engineered items, and inventory control of stock items.

The Nuclear Stores Manager is responsible for managing the control of material, including receipt, storage, and issuance of materials.

The Material Planning and Coordination Manager is responsible for managing material procurement planning, expediting, and coordination.

1.2.1.5 Project Controls

The Project Controls Manager is responsible for the development and maintenance of the site integrated schedule (SIS) and the administration of the Change Control Board (CCB). The SIS represents the detailed working logic schedule for all site activities. Initially at WBN, the plant, modifications, and engineering organizations scheduled their work activities independently and in individual scheduling networks. This lack of schedule integration contributed to ineffective change control, which at WBN sometimes led to problems in coordinating activities, and resulted in schedule delays in engineering modifications, system operation, and planned startup. This change focuses top management attention on an integrated planning and scheduling approach, resulting in more accurate and realistic planning, scheduling, and cost monitoring.

1.2.2 Site Licensing Manager

The Site Licensing Manager is responsible for the following activities:

- Serving as the principal onsite interface with the NRC, provides information and interpretations concerning regulatory requirements; directs the preparation for and conduct of NRC audits, inspections and meetings; interprets regulatory changes and responds to NRC requests; and ensures compliance with NRC reporting requirements;

- Establishing and maintaining a site licensing program for obtaining and maintaining required licenses and permits;

- Ensuring resolution of NRC issues by developing action plans and managing implementation of those plans;

- Providing management of the site operating experience reviews, generic issues, and the commitment tracking programs; and

- Coordinating site corrective action programs.

The Site Licensing organization is responsible for preparing and/or reviewing responses to violations, responses to NRC requests, technical specification changes, NRC generic letters and bulletins, and interpretation of regulations. It is also responsible for FSAR updates, interfacing and supporting NRC inspection teams and NRC resident inspector activities, and any other NRC interfaces at the site. In order to adequately perform its function, Site Licensing will

have direct access to the entire site organization. With the support of the entire site organization, the end result will be better coordination and more timely submittals.

Responsibility for determination of construction deficiency reportability (10 CFR 50.55[e]) has been assigned to Site Licensing.

NRC correspondence is processed and/or reviewed by the Site Licensing organization, which has responsibility for maintaining the site's interface with the NRC. Having this review responsibility, as well as responsibility for site input into the commitment tracking system, provides an effective means for ensuring that commitments are tracked and completed in a timely manner.

The Nuclear Experience Review Program (NERP) has been established as part of the TVA corporate program managed by Nuclear Licensing and Regulatory Affairs. Enhancements in this program will include the use of TVA and other utility experience when developing corrective or preventive action plans to address problems or issues at each of TVA's plants. This program will provide a long-term means by which TVA will benefit from the experience gained within the nuclear industry, as well as experience shared among each of TVA's nuclear plants.

The NERP includes:

- Reporting TVA plant experience and events.
- Evaluating TVA plant events as well as utility experience for applicability.
- Establishing and carrying out corrective or preventive actions.
- Incorporating operating experience into operator requalification training or issuing immediate attention bulletins for discussion at shift change.
- Researching applicable experience in the NERP data base and files for the development of corrective actions for adverse conditions and unplanned events, for input to design changes, and for the selection of replacement equipment.

The NERP organization includes an Operating Experience Manager and staff assigned to WBN to coordinate all NERP activities onsite.

1.2.3 Plant Manager

The Plant Manager is responsible for the safe conduct of day-to-day plant operations in compliance with licensing and regulatory requirements.

Reporting to the Plant Manager are the Operations Manager, Maintenance Manager, Technical Support Manager, and Radiological Controls Manager. Responsibilities for each of these managers are described in subsequent sections. In addition, the Plant Manager retains an administrative staff whose responsibilities include administrative and clerical support.

Before fuel load, realignments in some Operations responsibilities will be implemented to be consistent with the organizational structure to be utilized for TVA operating plants.

1.2.3.1 Operations

<u>Operations Responsibilities</u>

The Operations Manager reports directly to the Plant Manager and is responsible for the functional areas of operations, chemistry, fire protection, and work control.

The Operations Superintendent, who reports to the Operations Manager, directs the activities of the Operations Department. This superintendent coordinates changes in operating procedures and is responsible for supervision of day-to-day operational activities of the plant. The Operations Superintendent is also responsible for assessing the content and verifying the adequacy of classroom and simulator training.

The Operations Superintendent provides direct supervision to the Shift Operations Supervisors (SOS) and non-shift Operations support personnel. The SOS is responsible for the safe and efficient operation of the station in accordance with the operating license, technical specifications, and approved procedures. The non-shift support personnel are responsible for preparing and maintaining up-to-date operating procedures, operating personnel schedules, preparing responses for Nuclear Experience Review requests and other routine administrative functions. Selected personnel are assigned to observe training, review records and logs, and observe key activities to ensure that Operations management is aware of any significant issues arising from such activities.

In addition to their responsibilities for direct operation of the plant, Operations personnel provide support for preoperational testing, fuel loading, startup and surveillance testing. The Operations Department also provides support for the plant rescue and firefighting emergency teams.

The Chemistry Superintendent implements the Chemistry Program at WBN. This program includes water chemistry control, the operation of the radiochemical laboratory, environmental monitoring, control of plant effluents, hazardous waste control, spill prevention, waste oil, air pollution control permits, and plant lay-up coordination.

Improved Methods Used in Plant Operations

WBN management has instituted the following improvements in Plant Operations:

° Management Direction and Leadership of Operations Activities

The following practices are designed to strengthen the organization.

- The Operations Superintendent receives Senior Reactor Operator (SRO) license certification or equivalent training. This training provides a detailed understanding of plant systems and control room operations to assist in making management decisions relative to operations activities.

- The Assistant Shift Operations Supervisor (ASOS) position allows greater flexibility to the SOS in fulfilling job tasks. The ASOS is responsible for directing the activities of his assigned unit or designated area under the direct supervision of the SOS, providing the SOS greater opportunity to overview all plant activities and allows flexibility for the SOS and ASOS to directly observe field conditions. While the SOS responsibilities are not changed, the ASOS position serves a valuable function in training employees for advancement to the SOS position.

- The STA Program qualifies personnel with appropriate education to provide technical advice and engineering expertise to the SOS. The STA will provide this information during normal plant operations, for inoperable or out-of-service equipment, and in the unlikely event of plant accidents or abnormal conditions.

- Adequate Training

A multiple operator crew rotation system at WBN is used to ensure that one week out of six is available for training. SQN Operations personnel, as available, may be utilized in advisory positions during WBN startup. See Section 2.2 for a discussion of training.

- Attention to Detail in the Conduct of Operational Activities

By June 1988, WBN Operations personnel completed initial training designed to emphasize attention to detail in the conduct of operations. This training stressed the importance of strict compliance with approved procedures, formal communications, professionalism, etc. If a procedure cannot be used in its present form, then a procedure change request is initiated and processed.

In 1990, licensed operators completed an upgraded requalification program designed to reinforce attention to detail in the simulator. This program also upgraded the overall knowledge level of the operators.

In addition to initial training, periodic meetings with WBN management reemphasize the importance of "attention to detail" in the conduct of operations.

- Correction of Deficiencies in Plant Procedures

A number of problems with the surveillance instructions (SIs) at WBN were identified by NRC in early February 1985. To address these problems, a detailed checklist was used to conduct a complete technical and administrative review by assigned responsible sections.

The Site QA staff conducted a 10-percent parallel review independent of the line organization review. Site QA also performed a 10-percent postreview to assess technical and administrative adequacy of the revised SIs following their review and approval by PORC. These Site QA reviews identified problems with literal interpretation of Technical Specification requirements and surveillance requirements implemented in multiple SIs. To correct these problems, a complete re-review was conducted. Site QA again conducted a parallel and postreview of revised SIs. This Site QA review indicated that SIs for modes 5 and 6 were acceptable. An additional NRC inspection of 5 and 6 SIs was conducted in August 1985 with no deviations or violations identified. Review and revision of modes 1 through 4 SIs have followed a similar process of line review and QA review. The final review of modes 1 through 4 SIs was completed in 1986. An upgrade of plant SIs to

incorporate human factors improvements and field verification will be completed before fuel load.

A policy of strict compliance to procedures is required by Operations management and is fully defined in appropriate plant administrative procedures. These procedures also prescribe the actions to be taken if a procedure is incorrect or could degrade equipment or safety.

1.2.3.2 Technical Support Manager

The Technical Support Manager reports directly to the Plant Manager and is responsible for planning, directing, and coordinating the technical support activities of the plant. The Technical Support Manager directs preparation and implementation of system and component testing programs after turnover to plant, power ascension test programs, and plant system engineer program.

The Technical Support Manager is responsible for the following programs:

- Implementing and maintaining programs for ASME Section XI pump and valve in-service testing, repair and replacement and in-service inspection, 10 CFR 50 Appendix J local and integrated leak rate testing, heat exchanger performance, safety and relief valve testing, MOV diagnostic testing, snubber inspection, and condenser in-service inspection.

- Coordinating site fuel management, implementing the startup test and subsequent refueling test programs, reactor core operation and core performance monitoring, and performing plant reviews and safety evaluations for changes in core operation, core internals, abnormal operation, and transients.

- Temporary alteration control, drawing deviation, special tests, plant performance monitoring, special nuclear materials control, and plant process computer.

- In coordination with the Maintenance organization, development of maintenance programs, preparation and review of procedures, implementation of preventive maintenance requirements, and field support of maintenance craftsmen.

- A systems engineering program, which provides a single contact point for system history, status, testing, and resolution of major system problems and coordinates across organizational lines to determine the root cause of system problems and formulate effective, timely resolution.

1.2.3.3 Maintenance

The WBN Maintenance organization has been restructured to enhance the strong ties developed with the corporate nuclear maintenance organization and to more clearly define the responsibilities of maintenance personnel, including supervision. Specific improvement initiatives are underway in the areas of maintenance activity planning and upgrade of the preventive maintenance program. These initiatives have and will continue to be supported by corporate nuclear maintenance and lessons learned from TVA and industry experience. These initiatives will emphasize improvements in these areas as delineated in the CNPP.

The Maintenance Manager reports directly to the Plant Manager is responsible for planning, directing, and coordinating plant maintenance activities. The Maintenance Manager, in coordination with the Technical Support Manager, reviews trends, experience documents, and study results to determine the need for plant equipment and maintenance changes and prepares recommendations for improvement of plant equipment, safety, and economy. The Maintenance Manager coordinates changes in maintenance procedures and is responsible for supervision of day-to-day plant maintenance activities.

The Maintenance Manager is responsible for the following programs:

- Preventive and corrective maintenance, including station equipment, components, and systems, schedules, manpower requirements, inspections, equipment tests, and changes to maintenance intervals as required for improved efficiency and reliability of plant equipment.

- Predictive monitoring, which includes vibration diagnostics, lubrication analysis, and the use of thermography.

- Implementing necessary in-plant activities to maintain environmental qualification of plant equipment.

1.2.3.4 Radiological Control

The Radiological Control Manager reports directly to the Plant Manager is responsible for planning, directing and coordinating the Radiological Control activities of the plant. The Radiological Control Manager directs the preparation and implementation of the Radiological Protection, Radiological Health, Radiological Field Operations, and Radioactive Waste Programs. The Radiological Control Manager provides advice and guidance to site organizations on radiological matters and interfaces with

BFN, SQN, and Corporate Headquarters personnel on radiological issues. The Radiological Control organization reflects enhancements described in the CNPP.

The above programs consist of the following major activities:

- Implementing the Site ALARA program and the site exposure management activities, to ensure that worker exposure is as low as is reasonably achievable (ALARA).

- Providing audits/assessments on the implementation of the Radiological Control Program, and implementing the Radiological Corrective Action Programs to ensure that deficiencies are identified and recorded, and that adequate corrective action is taken in a timely manner.

- Trending and assessing the effectiveness of Radiological Control activities at WBN.

- Interfacing with organizations external to Radiological Control for implementation of the limited QA Program for radiological control.

- Implementing the Radiological Control Programs for dosimetry, dosimetry records, respiratory protection, and instrument calibration.

- Implementing the radioactive solid waste reduction, handling, and shipment program.

- Performing in-plant radiological surveillance.

- Ensuring compliance with established Radiological Control Policy and instructions.

1.2.4 Site Controller

The Site Controller is responsible for providing financial and budget support to the site. The Site Controller coordinates and monitors the preparation of all budgets, capital or recovery project proposals, multiyear plans, and special financial analyses; ensures compliance with TVA, NP, and site financial management and accounting procedures and instructions; establishes systems for measuring, controlling, and reporting site financial performance; and provides cost analysis and estimating support.

1.2.5 Site Programs and Support Manager

The Site Programs and Support Manager (SP&SM) reports directly to the Site Vice President and is responsible for procedures, emergency preparedness planning, industrial safety, site security, and document control.

These programs consist of the following activities:

- Emergency response for personnel injury and hazardous material accidents.
- Industrial safety, health, and risk protection including the hazardous materials program and respiratory protection program.
- Control of documents, drawings, and records through operation of the Document Control and Records Management Center.
- Industrial and nuclear security including implementation of the Physical Security/Contingency Plan and the Security Personnel Training and Qualification Plan.
- Implementation of the emergency preparedness program.
- Occupational medical and health services including random and "for-cause" drug screening.
- Preparation, coordination, issuance, and maintenance of site procedures and instructions. Procedures enhancements are discussed in detail in Section 2.3 of this chapter.

1.2.6 Completion Assurance

The WBN Completion Assurance organization is the focus for quality and regulatory assurance issues for the site. Because of WBN's long construction history and documented quality concerns, the decision was made to put this organization in place to strengthen oversight of the project and to provide additional assurance that WBN is designed and constructed in accordance with regulatory requirements and TVA commitments. The Vice President, Completion Assurance, directs the following activities:

- Quality Assurance
- Quality-Related Special Projects
- Quality Control
- PAC/AQ

CAP, Special Program, and individual deficiency closures are the responsibility of the Vice President, Completion Assurance. In addition, site QA and QC training falls under his cognizance. Reporting to the Vice President, Completion Assurance, are the Site Quality Manager, the Project Manager, PAC/AQ, and the Project Manager, QA Records. Additionally,

the Quality Improvement Advisor receives functional direction from the Vice President, Completion Assurance.

1.2.6.1 Site Quality Manager

The Site Quality Manager is responsible for establishing and maintaining a site QA organization that performs the quality engineering, quality control, quality audit, quality improvement, and quality monitoring functions.

Duties and responsibilities of the Site Quality Manager include:

- Developing, planning, and assuring implementation of detailed nuclear plant QA and QC programs.
- Performing quality engineering functions relative to site activities and providing verification of those activities including QC inspections.
- Evaluating the effectiveness of the NQA program by monitoring and making recommendations to site management regarding its implementation.
- Reviewing and verifying that site instructions contain applicable QA requirements.
- Developing and implementing a QC inspection program that covers receipt of the purchased items, modifications, and maintenance activities.
- Designating a representative to participate as a member of the PORC.
- Participating as a member of the WBN Nuclear Safety Review Board (NSRB).
- Working with line management to support quality improvement by performing functions such as trend analysis, root cause analysis of quality problems, evaluation of dispositions of major quality issues, assistance in implementing quality improvement initiatives, and performance of QA operational/startup readiness assessment plans.
- Administering the TROI systems (the adverse condition report data base) and the QC Inspection system (the inspection data base) for the site.
- Ensuring that in-depth technical and programmatic audits are planned and conducted to evaluate the effectiveness of applicable programs.

The restructuring of the Site Quality Manager's organization has provided an overall improvement in the nuclear QA program. Reorganization has led to improved and more consistent performance of functions that were not consistently performed in the past or that were dispersed among separate organizations. Overall, the consolidation of multiple QC groups into a single organization has resulted in a QC program that will perform inspections in a more consistent manner under a unified set of procedures.

The Site Quality Manager's organization has been strengthened to include a separate Quality Engineering section and assignment of the Site Audit section to report directly to the Site Quality Manager. The Quality Control functions for modifications and material receipt will be performed by a QC Contractor with certified, experienced personnel under the TVA Quality Program. The Site Quality Manager will provide oversight and coordination of this function with experienced QC management.

Additional strengthening of the QA organization has been accomplished by filling several key positions with experienced managers. Specifically, these positions are the Site Quality Manager, the Quality Engineering Section Manager, the Quality Control Section Manager, the Special Projects and Support Manager, and the Quality Monitoring Section Manager.

1.2.6.2 Project Manager, Program for Assurance of Completion and Assurance of Quality (PAC/AQ)

The PAC/AQ program was established by TVA senior management to provide additional assurance of construction completion and WBN's ability to start up and operate in accordance with safety and quality standards.

The PAC/AQ program is designed to ensure the following:

- Plant commitments and design are known.
- The plant is constructed as designed.
- Material conditions are satisfactory.
- Potential new issues or problems are identified and resolved.
- Corrective actions defined are implemented.
- Implemented corrective actions address the problem in a complete manner.
- Operational completeness is achieved.

Areas of concern or specific recommendations identified during the course of the PAC/AQ reviews will be documented and tracked to closure.

1.2.6.3 Project Manager, QA Records

The Project Manager, QA Records, is responsible for managing the implementation of the QA Records CAP Plan and the Additional Systematic Record Review (ASRR) program. The QA Records Cap plan defines actions to resolve issues associated with WBN construction and operations QA records. Reviews conducted of WBN construction and operations records required for licensing found that some records (1) were not retrievable in a timely manner or were potentially missing, (2) were maintained in improper storage, or (3) had quality problems (e.g., were incomplete, technically deficient, or administratively deficient).

The Project Manager, QA Records is assisted by the Records Assessment Team, Records Response Team, and the QA Records Team.

In 1990, several concerns were raised by TVA and the NRC related to the lack of timely progress in the CAP activities necessary to resolve previously identified problems and to perform an overall trend analysis of results. In addition, the NRC was concerned that TVA had not performed an all-encompassing systematic records audit to ensure that all records required by applicable codes and standards will be available for licensing.

In order to satisfy this latter concern, TVA performed a preliminary trend analysis. It was concluded from this analysis that the previous reviews of records did not provide comprehensive coverage of the ANSI N45.2.9 records types. In addition, the results from previous reviews focused mainly on known problem areas.

As a result of these findings, TVA committed to perform an additional systematic review of approximately 12,000 records that would provide coverage of ANSI N45.2.9 record types applicable to WBN. In addition, an inspection would be made of 1200 hardware components to determine if the records match the plant configuration.

The ASRR program was developed and described in a document that was submitted to the NRC on January 28, 1991 (Ref. 74). This program provides for the use of random sampling on a statistical basis to provide coverage of applicable ANSI N45.2.9 record types and distribution across the 20 major plant elements. It further establishes acceptance criteria based on a statistically derived 95 percent confidence level

that specified percentages of the population will be free from unresolved defects. These acceptance criteria differentiate between primary deficiencies that are potentially significant (95/95) and secondary deficiencies that are administrative in nature (95/90).

Through the use of statistically based trend analysis and extent of condition evaluation, the ASRR will provide assurance that defective areas in the WBN records population are identified. Further, through the efforts of a dedicated Records Response Team (RRT), the identified problems will be dispositioned and closed to assure that the overall population of WBN records will satisfy the established acceptance criteria at the completion of the program.

The ASRR document has been submitted to the NRC and questions and comments raised from their review have been answered. TVA plans to incorporate this program and other related changes into a revision of the QA Records CAP for submittal to the NRC. In this way, there will be one program description for the corrective actions required for all QA Records at WBN.

1.2.7 Site Training Manager

Before 1986, the site training organization consisted of the Engineering and Technical Training (E&TT) Section, which conducted General Employee Training (GET) and various Maintenance training programs. Additional training was conducted by other site organizations. Operator training was conducted by plant operators with the initial training for the certification of operators conducted at the Power Operations Training Center (POTC) near SQN. In January of 1986, the responsibility for providing onsite operator training was transferred from the Plant Manager to the Nuclear Training (NT) Manager. This transfer allowed the Operator Training Program to become more consistent with Operator Training at other sites. In 1987, the Watts Bar Training Department (WBTD) was established as the onsite organization responsible for site training.

The Site Training Manager reports to the Manager, Nuclear Training, for technical direction and to the Site Vice President for project functional direction.

The WBTD provides training services to the site, which include:

- Achieving and maintaining accreditation of the training programs accredited by the National Nuclear Accrediting Board.

- Conducting formal training for operations, maintenance, chemistry, radiation control, technical, and STA personnel.
- Conducting other site-wide standardized training such as General Employee Training.
- Certifying and maintaining the plant reference simulator.
- Administering the Watts Bar Training Center (WBTC).

See Section 2.2 for a more detailed discussion of the WBN training programs.

1.2.8 Concerns Resolution Staff Site Representative (CRS-SR)

The CRS-SR is a full-time employee at WBN who reports to the CRS Manager. The CRS-SR interacts with the Site Vice President on a routine basis concerning potential problem areas and significant issues.

1.2.9 Site Human Resources Manager

The Manager of WBN Human Resources, who receives functional direction from the Site Vice President, provides support and assistance in the areas relating to staffing, labor relations, employee communications, compensation administration, and affirmative action, including the Equal Employment Opportunity function.

1.2.10 Quality Improvement Advisor

TVA has embarked on a long-term initiative to improve its quality performance through the implementation of a total quality management (TQM) process. The TVA Board of Directors and other senior managers have demonstrated a high level of commitment to TQM through the following actions:

- Naming senior managers to serve in full-time, rotating assignments as TQM managers;
- Allocating significant segments of Senior Management meetings to TQM activities; and
- Initiating a TQM assessment.

In the past, WBN has been successful in addressing technical and hardware issues, but has been less successful in addressing "people" issues. Positive initiatives have been undertaken, but their benefits have often been minimized by the disruptive effects arising from false starts and management changes. TQM, however, will provide a means to

empower employees to be an effective and accountable part of the solution to problems and to better harness their considerable talents in improving quality.

The TQM program for WBN is being implemented through the Quality Improvement Advisor, who reports directly to the Site Vice President. TQM will enable WBN to allocate its quality resources in a more effective manner. This will occur by proactively seeking process improvements so that quality problems are prevented before they occur instead of detected after the fact.

The program provides for WBN managers to be trained in the TQM principles, with the expectation that these principles will be integrated into normal work activities. The program also provides for WBN employees to be given awareness orientation to gain their understanding and acceptance of the TQM program.

The implementation of TQM processes at WBN does not constitute a quick fix, but rather a long-term commitment to continuous quality improvement. Watts Bar and corporate managment are committed to this initiative and are confident that it will play a significant, positive role in moving WBN toward successful licensing and quality operations.

1.3 Responsibility, Accountability, and Authority

Organizational and personal responsibilities were not clearly defined for past corporate and WBN organizations. This resulted in overlap of responsibility and, in some cases, responsibility for important items not being assigned or assumed. It also has resulted in actions being taken without clear lines of responsibility or accountability.

The actions described in Section 1.2 of this chapter have been taken to clearly define both corporate and WBN organizational responsibilities. Additionally, actions have been taken to ensure that each manager and employee clearly understands his or her areaof responsibility and expects to be held accountable for achieving excellence in performance. TVA has committed to provide the authority and resources necessary to carry out the responsibilities of managers and their employees.

The following form the basis for employee performance accountability:

- Position descriptions have been prepared for management positions at WBN. These descriptions have been reviewed and approved by corporate managers to ensure that overlaps and gaps of management responsibility do not occur.

- Management-employee communication informs employees of WBN's goals/objectives and what is personally expected of them. Keeping employees informed of these objectives is the basis for personal accountability.

- The plant organizational structure has been designed to give operations and maintenance personnel an "ownership" attitude and hence pride, responsibility, and accountability for their work.

- The Performance Planning and Evaluation for Managers is used for annual evaluations of each manager's performance against established written expectations.

- Disciplinary action is specified by procedure for not following plant policies or procedures and ranges from verbal warning to termination.

The actions described above are designed to motivate employees to perform well, to provide incentives for improving performance, and to hold employees personally accountable for their work.

1.4 Management Knowledge of the Plant

TVA has taken positive steps at WBN to increase the level of plant knowledge in the line managers. Actions have been initiated to develop a substantial number of line managers and supervisors in the area of plant operations. Proven capabilities acquired during field assignments are considered a prerequisite for plant line management assignments. Many of the key plant managers and supervisors have received SRO licenses, Technical Staff and Technical Staff Managers (TS&TSM) certification training, STA training, or the systems portions of either of the latter two programs. These programs give the trainee an extensive knowledge of plant theory and operation. See Section 2.2 for a discussion of training.

WBN continues to aggressively recruit experienced managers and improve training programs for managers, engineers, and operators. These training programs enhance technical and plant knowledge and provide a source of capable personnel for future management positions.

2.0 MANAGEMENT CONTROL AND INVOLVEMENT

In the past at WBN, the level of management involvement in controlling work practices has been inconsistently exercised. To address this problem, the Senior Vice President of Nuclear Power establishes goals and objectives. The goals and objectives are established annually for the Nuclear Power organization. Once the Nuclear Power objectives are established, each vice president or operations-level manager prepares Tier 1 goals to support the objectives. Following approval of the Tier 1 goals, Tier 2 and Tier 3 goals are developed by subsequent levels of the organization in support of the next higher tier goals.

Tier 1 goals, which are prepared annually, cover a period of 3 to 5 years, and are reviewed and revised once a year. Tier 2 goals are prepared annually, cover a period of 2 years, and are reviewed and revised annually. Tier 3 goals are prepared annually to support the upcoming year's Tier 1 and Tier 2 goals.

The WBN Tier 1 and 2 goals for the current fiscal year are posted in areas readily accessible to employees. These postings are updated periodically during the year to reflect the progress made in achieving WBN's goals.

The Site Vice President's implementation of these, as well as other areas receiving corporate emphasis, is expected to produce the following results: improved management control and increased management involvement; establishment of new effective communication of expectations to employees and utilization of feedback from employees; increased training and improved procedures to develop work skills and improve work control so that accountability for performance is established; increased management attention to and upgrade of the system for corrective action; upgrade of the site quality organization to better identify and assist the line organization in resolving deficiencies; and increased management involvement and attention to address employee concerns.

2.1 Communication With Employees

Effective management control requires that goals and objectives be clearly communicated. Because every employee is responsible for quality performance, all employees must receive and understand this information.

It is equally important that employees be afforded routine communication channels to provide feedback information and ideas to managers and coworkers. A number of methods are being used to improve communications.

The Site Vice President and senior managers meet regularly to discuss scheduling priorities, quality, goals and objectives. Priorities are communicated in these meetings and are expected to be communicated to employees. A weekly performance meeting is held to discuss overall priorities and expectations at WBN. The Site Vice President also holds small group sessions and issues memoranda and newsletters to communicate expectations to employees.

WBN strongly endorses TVA's policy which encourages employees to express differing views, with special emphasis on encouraging views associated with the safety of design, construction, and operation of TVA's nuclear plants (see Appendix 6 of the CNPP). Consistent with Nuclear Power's actions regarding this policy as described in Chapter V of the CNPP, WBN's approach ensures that (1) safety and quality are the paramount consideration of every TVA employee, (2) each individual takes responsibility for the quality and safety

of the activities performed by him or under his direction or review, and (3) employees are not intimidated or harassed for expressing concerns.

2.2 Training

WBN management recognizes that effective training plays a vital role in maintaining high-quality performance and achieving needed performance improvements. This recognition has led to a strong commitment to training by WBN and TVA corporate management in terms of time, manpower, and resources. Two examples of this commitment are the formation of the WBTD in 1987, and the construction of the WBTC, which was completed in 1988. This facility, which includes a site-specific simulator, provides modern, efficient training resources to the site.

The Watts Bar training activities are conducted either by line management or by the WBTD to ensure that WBN personnel possess the knowledge and skills required to perform their assigned duties. Some significant training activities that benefit WBN are discussed in the following sections.

2.2.1 Accreditation Status

TVA is committed to achieve and maintain accreditation for those training programs accredited by the National Nuclear Accrediting Board. The accreditation status of each WBN training program is as follows:

Training Program	Initial Accreditation	Accreditation Renewal Schedule
° Non-licensed Operator	December 1990	December 1994
° Reactor Operator	December 1990	December 1994
° Senior Reactor Operator/Shift Supervisor	December 1990	December 1994
° Licensed Operator Requalification*	December 1990	December 1994
° Shift Technical Advisor	December 1990	December 1994
° Technical Staff and Technical Staff Managers	December 1990	December 1994

° Instrument and Controls Technician	May 1985	September 1991
° Radiological Control Technician	August 1987	September 1991
° Radiochemical Laboratory Analyst	August 1987	September 1991
° Electrical Maintenance	August 1987	September 1991
° Mechanical Maintenance	August 1987	September 1991

* The Licensed Operator Requalification Training Program was initially accredited as part of the RO and SRO programs in December 1990. This program's accreditation status will be reviewed independently during the 1994 renewal exercise.

2.2.2 Operations Training

Operator training programs at WBN are performance-based to demonstrate that operators possess the technical knowledge and academic background required to reason analytically and perform their duties safely and efficiently.

Nonlicensed Assistant Unit Operators (AUO) receive approximately 64 weeks of training prior to becoming permanent AUOs.

The AUO Requalification Program is conducted for at least 5 weeks per year and consists of retraining on various aspects of plant operations. It serves to provide formal training in plant modifications, procedure changes, and industry operating experience.

Selected AUOs receive Reactor Operator (RO) cold license certification and prelicense training, which satisfy the requirements for an NRC-administered Cold License RO exam. AUOs selected for unit operator upgrade training attend the Electrical Upgrade Training Program to familiarize themselves with electrical theory, the operation of plant electrical systems and electrical safety so that they may eventually perform switching duties inside the plant and in the switchyard.

Personnel selected for ASOS or SOS positions receive SRO Cold License Certification and prelicense training, which satisfy the requirements for an NRC-administered Cold License SRO exam.

All personnel seeking an RO or SRO Cold License receive observation training on an operating unit to meet NRC requirements.

The Licensed Operators Requalification Program is conducted for at least 6 weeks per year and consists of retraining on various aspects of plant operations. It serves to provide formal training in plant modifications, procedure changes and industry operating experience. This training consists of classroom lectures and simulator exercises. Summaries of applicable TVA and industry events are included in the requalification program lesson plans. This emphasizes the concept of "lessons learned," including applicable SQN events, in an effort to prevent similar events at WBN. In addition to formal classroom training, a newsletter is published to describe industry events and plant conditions of immediate interest to operators.

STAs provide engineering expertise onshift and an independent assessment of plant status during emergency conditions. A degree in engineering, physical science, or the equivalent is a prerequisite to the STA function. STA incumbents participate in the licensed operator requalification training program.

The Operator Degree Program and the Engineering SRO Training Programs have been developed to broaden the knowledge of operators and engineers, increase engineering expertise on operating shifts, and upgrade the qualifications of members of both professions.

The Operator Degree Program was created to allow Operations personnel with extensive power plant experience to attend the University of Tennessee at Chattanooga as full-time students to pursue Bachelor of Science degrees in physics. Several SROs in Operations have obtained degrees through the program. The Engineering SRO Training Program allows selected personnel, who have engineering degrees but no experience in TVA's Operations organization, to enroll in a program that provides the equivalent of the regular SRO training program with the intent of obtaining an SRO license.

2.2.3 Maintenance Training

Maintenance training programs for electrical, mechanical, and I&C craftsmen are developed using INPO-specified methods to provide task-based training to maintenance personnel. Each incumbent either receives initial training or meets stringent prerequisites and participates in continuing and specialized training annually.

Well-equipped shops and laboratories are provided in the WBTC. Proper training of maintenance craftsmen and foremen results in quality work, compliance with requirements, and procedural adherence.

2.2.4 Technical Staff and Technical Staff Managers Training

Plant-specific training for WBN's technical staff and technical staff managers is covered by the TS&TSM Training Program.

The TS&TSM Training Program provides orientation in plant systems; plant safety design philosophy; applied fundamentals; plant reference materials and procedures; nuclear codes, standards and regulations; plant maintenance and work controls; plant modifications and maintenance controls; ALARA job planning; and industry experience, procedure, and equipment changes. WBN procedures require selected plant personnel, including plant engineering supervisors, to complete the TS&TSM Training Program.

The TS&TSM Advanced Training Program is for managers and engineers selected by senior site management as potential candidates for senior plant management positions.

The TS&TSM Advanced Training Program provides detailed training in plant systems; reactor theory; thermodynamics, heat transfer, and fluid flow; electrical theory; plant chemistry; health physics; materials science; nuclear codes and standards; and simulator operations (normal and emergency). A Control Room Simulator Certification is awarded upon successful completion.

2.2.5 Radiochemical Laboratory Analyst Training and Radiological Control Technician Training

Training programs for these critical plant positions have been developed using INPO-specified methods to provide task-based training to all personnel. Each incumbent either receives initial training or meets stringent prerequisites and participates in continuing and specialized training annually. Well-equipped laboratories and training areas are provided in the WBTC.

2.2.6 Other Training Programs

Numerous other training programs and activities are conducted by line management, training contractors, and/or the WBTD to provide assurance that personnel are qualified to perform assigned tasks. These include:

- Procedures training in selected program areas
- QC inspector training
- QA auditor training
- Industrial safety training
- ALARA training
- Plant systems training
- Root Cause Analysis Training
- Maintenance Planner Training
- Modification Craft Training
- System Engineer Training

The Site Vice President and line management are responsible for selecting personnel to attend training programs and for determining required training for site personnel.

2.3 Procedures

The General Manager, Materials, Contracts, and Administrative Support, who reports to the Vice President, Nuclear Assurance, Licensing and Fuels, has the responsibility and authority to monitor and coordinate the development of Nuclear Power Policies, Directives and Standards, as well as to establish consistency by overseeing and maintaining a system of corporate-level procedures for site standardization. Site Procedures and Instructions are to represent appropriate extensions of the requirements, commitments, and responsibilities for functions specified in the upper-tier Nuclear Power Policies, Directives, and Standards.

Procedures needed to support WBN unit 1 fuel load and safe operations will be upgraded or developed to accomplish the following:

- Correct documented deficiencies or weaknesses. These deficiencies or weaknesses have been identified and documented by NRC, industry organizations (e.g., INPO), and internal TVA audits or inspections.

- Account for completed plant modifications and the results of system walkdowns.

- Incorporate identified requirements and commitments from Nuclear Power Standards.

- Transfer of "Lesson Learned" from the SQN procedures upgrade effort where applicable to WBN.

- Reflect changes in responsibilities and authorities resulting from major plant reorganizations.

Line organizations are responsible for assuring that site procedures implement upper tier commitments and requirements. A WBN Site Procedures staff supports the line organizations in

developing and revising site procedures. Additionally, it is responsible for scheduling, tracking, and coordinating the review and approval of site procedures.

WBN is implementing a procedures upgrade program. The purpose of the procedures upgrade program is to ensure that procedures and instructions are properly developed to support startup and operation of WBN unit 1. Operations, technical, chemistry, engineering test, radiological control, and administrative procedures are included. For some categories of procedures, the upgrade includes an extensive review, upgrade, and enhancement by reformatting to approved writers' guides. Before fuel load of unit 1, WBN will upgrade and enhance (including a full technical review) technical specification Surveillance Instructions (SIs), Instrument Maintenance Instruction (IMIs), and Operations Procedures.

The following is a more detailed description of the scope of the procedures upgrade program described above. This upgrade will assure that industry and NRC concerns are accounted for in WBN's procedures and instructions.

- Surveillance Instructions (SIs)

  Includes implementation of the Writer's Guide for technical documentation, incorporation of vendor recommendations, and a complete technical review to ensure the procedure incorporates the latest design output, NRC commitments, corrective actions, and upper tier requirements.

- Maintenance Instructions (MIs)

  Included in this area are MIs in the electrical, instrumentation and mechanical disciplines. Instrument MIs will receive an upgrade and enhancement as described above for SIs. Other MIs will receive a technical review to verify technical content adequacy, incorporation of commitments, and current plant configuration. Maintenance procedures will receive a technical and human factors review.

- Technical Instructions (TIs)

  TIs will receive an upgrade and enhancement review as described for MIs, primarily in the engineering test, chemistry, and radiological control areas.

- Operating Instructions (OIs)

  Includes upgrade for technical adequacy and enhancement to the writers' guide for Normal Operating Instructions to ensure

standardization and the elimination of human factor problems. These instructions include the System Operating Instructions (SOIs) and General Operating Instructions (GOIs).

The Emergency Instructions (EIs) will be reviewed and upgraded to ensure implementation of the Westinghouse Owners Group (WOG) Guidelines. WBN Operations personnel are working closely with the WOG and SQN on the development of EIs. The Abnormal Operating Instructions (AOIs) will be reviewed and revised as necessary to assure technical adequacy and enhanced to a standard format, which is under development.

- Administrative Procedures (APs)

  To ensure that the administrative processes are controlled at the lowest possible organizational level, an administrative procedure hierarchy will be developed and implemented.

  The goal of the upgrade effort is to ensure that duplication, complexity, and conflicts do not exist in this system. A streamlined, consolidated system has been developed to control Nuclear Power processes efficiently. This consolidated system was developed by a joint WBN, SQN, and BFN Task Group to assure a consistent administrative procedures system for all sites.

2.4 Corrective Action

2.4.1 Introduction

The corrective action process has been standardized for TVA's corporate office and site organizations. This process is designed to obtain timely and effective identification and resolution of adverse conditions.

2.4.2 Specific Actions to Improve the Corrective Action Process

WBN has a common program of corrective action for ensuring that adverse conditions are promptly identified, documented, evaluated, corrected, tracked, trended, and reported to management in a manner consistent with their importance to safety, and that when appropriate, actions are taken to prevent their recurrence.

Recent enhancements to the program were implemented in February 1991. Better defined criteria have been established for identifying significant adverse conditions to management. These conditions are documented on Significant Corrective Action Reports (SCARs).

Adverse conditions that do not meet the threshold criteria for SCARs will be documented, corrected, and trended in one of the other administrative control programs. The Nuclear Power Corrective Action Program includes a number of Administrative Control Programs that identify and correct adverse conditions that do not meet SCAR criteria.

The Administrative Control Programs contain the following Corrective Action Program elements:

- Identify and track to closure actions necessary to correct adverse conditions.
- Standardize at all sites.
- Trend as required by STD 3.8.
- Review against the criteria for SCARs.
- Define the reportability/operability review if required.
- Define the generic review if required.
- Provide for recurrence control if required.

The most recent significant enhancement within the Corrective Action Program is the elimination of the Problem Reporting Document (PRD) process. Eliminating PRDs simplifies the corrective action process by merging issues formerly categorized as PRDs and nonsignificant CAQRs. The revised document is called a Problem Evaluation Report (PER). The PER form is easier to generate in that less up-front information is required of the initiator, although all necessary information will be provided through subsequent reviews. Unlike the former PRD, the body of the PER addresses reportability, operability, generic review, and extent of condition, thereby providing better assurance that the significant conditions will not be overlooked. There is also a greater emphasis on providing adequate documentation and performing adequate closure.

Nuclear Power Standard 3.4 defines the current Corrective Action Program. WBN site prodecures were issued to implement this program.

TROI is the tracking system for SCARs, Finding Identification Reports (FIRs), and PERs. This computer program has been implemented for tracking these adverse conditions throughout Nuclear Power. The site quality organization performs trend analyses of identified trend indicators on a monthly basis and reports the results to

the Site Vice President and major site organizations. Site trend analysis results are also reported to the Corporate QA organization (NQA) on a monthly basis. Additionally, NQA identifies QA trend indicators to the responsible organizations and performs a corporate-wide QA trend analysis.

Additionally, at WBN, all old program adverse conditions have been converted for unit 1 to SCARs, FIRs, and PERs to facilitate a single source of information for trending and to ensure all adverse conditions are resolved through the new program. Conversion of unit 2 adverse conditions is in process.

2.5 Quality Assurance

2.5.1 Introduction

TVA has already initiated improvements in the QA program to address recognized weaknesses. These improvements were initiated by the Senior Vice President of Nuclear Power and are reflected in the NQA Plan. QA requirements have been included by the responsible organizations in appropriate standards, procedures, or instructions, and have been validated by NQA. This ensures that quality requirements are maintained, while placing the focus for the development of the "how to" program at the responsible organization level.

2.5.2 NQA Plan

The following are major features of the NQA Plan:

- Philosophy Change - The plan constitutes a change in philosophy. The plan emphasizes greater responsibility for quality performance within line organizations.

- Verification - QA will remain in a verification role to assure effective implementation of quality requirements. This verification shall occur through performance-based activities (audits, inspections, reviews, monitorings). This concept provides a method to apply a degree of QA verification commensurate with the activity's importance to safety and provides a means of focusing on quality problem areas. For example, quality problem areas will be expected to receive a greater than their proportionate share of verification activities.

- Scope - The scope of the QA Plan includes not only safety-related, but also quality-related programs. Examples of the quality-related programs which now fall within the QA program are emergency preparedness, nuclear safety, and environmental protection.

2.6 Concerns Resolution

The original ECP was implemented at WBN on February 1, 1986. The program provided an alternate avenue for resolving concerns that could not be resolved through the normal process, i.e., line organization. On July 16, 1991, TVA's nuclear management retitled this program "Concerns Resolution." This name change was implemented to emphasize and encourage the prompt and effective resolution of concerns associated with the design, construction, and operation of TVA nuclear plants through the normal line process, while continuing to provide alternate avenues for concerns that cannot be resolved through the normal process.

The Senior Vice President, Nuclear Power, established the Concerns Resolution Staff to ensure that concerns important to safe and reliable nuclear plant operations are resolved promptly and effectively. This responsibility is accomplished through the Manager, CRS, and the Site Representatives. The Manager, CRS, reports directly to the Senior Vice President, Nuclear Power, to ensure that matters involving substantive concerns receive appropriate management attention.

A key element of this program continues to be the CRS Site Representative (CRS-SR), who reports directly to the Manager, CRS. The CRS-SR is responsible for:

- Providing assistance, support, and guidance to managers to facilitate resolution of concerns within line organizations.
- Providing an alternate avenue for employees to express concerns, maintaining confidentiality when requested.
- Directing employees to the appropriate channel for resolving issues outside the scope of the CRS area of responsibility (e.g., management and personnel-type issues to line management and/or Human Resources).
- Referring concerns to line or other organizations and monitoring the effectiveness of their resolution.
- Evaluating and initiating corrective actions for the resolution of concerns that could not be resolved effectively through line organizations.

- Maintainig tracking systems, data bases, and records related to the disposition of concerns. Analyzing this information for identification of trends or programmatic problems and providing feedback to site management.

- Providing feedback to employees on the resolution of concerns evaluated by the CRS.

- Monitoring the completion of corrective actions and verificatins for Corrective Action Tracking Documents (CATDs) that resulted from the ECSP. Conducting overviews of the CATD packages to ensure proper closure.

The CRS-SR interacts with the Site Vice President on a routine basis concerning potential problem areas and significant issues. These intereactions allow resources to be focused on resolving significant issues and improving employee/supervisor relationships.

2.7 Design Control

2.7.1 Introduction

WBN has experienced problems with the control of design changes and plant modifications. (Refer to Chapter VI of the CNPP.) Weaknesses have been identified in the depth and documentation of engineering work for design changes and in maintaining consistency between "as constructed" and "as-designed" information.

These weaknesses were assessed by TVA as being attributable to the following root causes:

- The lack of centralized, established lines of authority, responsibility, and accountability for performance of key design control functions needed to ensure that design integrity is maintained;

- Inadequate engineering evaluations, a lack of detail in design output, and the absence of a centralized design input/design basis; and

- Use of design and modification control methods that did not provide the coordination among groups required to ensure accurate documentation of plant configuration and performance of effective safety evaluations.

These weaknesses have adversely affected certain aspects of the installation and modification processes, which have been identified and are being corrected through corrective action programs.

To help prevent further problems at WBN, engineering responsibilities have been consolidated, an improved design change control process has been developed, and a Change Control Board (CCB) has been established (see Section 2.7.4). The improved design change control process was developed in conjunction with the WBN DBVP (see Chapter III, Section 2.3).

2.7.2 Engineering Organization

As described in this chapter, Section 1.2.1.2, TVA has reassigned engineering responsibilities to one organization, NE. NE has established an engineering project under the direction of the EM dedicated to WBN, with key management and engineering personnel located at the site taking direction from the Engineering and Modifications Manager.

2.7.3 Design Change Control

WBN has implemented the Design Change Improvement Program (DCIP) as part of the DBVP. The DCIP was developed to implement the new change process identified in Chapter VI of the CNPP. The DCIP developed the procedures which support the transition from the previous two-drawing system of design change control to the improved single-drawing system, which is based on the change package process.

Design Change Notices (DCNs) are used for design changes. The DCN controls a design change as a package from authorization and detailed design development through plant implementation and QA acceptance, with final drawing and affected document issuance occurring after the plant has been modified. This improved process allows for greater coordination and configuration control.

As WBN unit 1 approaches fuel loading, TVA will enhance the DCN process to include additional requirements (e.g., Unreviewed Safety Question Determination) needed for an operating plant.

2.7.4 Change Control Board

A CCB has been established at WBN. This board provides overall management control and approval of proposed plant changes. The CCB consists of six members, including the Site Vice President, the Engineering and Modifications Manager, the Plant Manager, the Site Controller, the Site Quality Manager, and the Site Licensing Manager. The CCB administrator schedules, plans, and maintains records of

each meeting. The Site Quality Manager serves on the board to review the QA aspects of proposed changes. Additional members may be appointed as deemed appropriate by the Site Vice President.

The purpose of the CCB is to control plant modifications by reviewing proposed changes. The CCB approves those changes that may affect compliance with nuclear safety, licensing requirements, personnel safety, or that correct a system operating deficiency. The CCB provides centralized authority over the approval of modifications.

3.0 LESSONS LEARNED FROM SEQUOYAH NUCLEAR PLANT AND BROWNS FERRY NUCLEAR PLANT

3.1 Management and Organizational Structure

WBN will have the benefit of lessons learned from SQN and BFN since the management and organizational structure at these plants has been in place to implement the overall Nuclear Power restructuring and organization described in Topical Report TVA-NPOD89-A (Ref. 3). This will allow enhancement of the WBN management and organization structure based upon actual experience from SQN and BFN prior to the operation of WBN. This process is maintained through periodic discussions among the SQN, BFN, and WBN Site Vice Presidents and key managers, as well as through periodic discussions with corporate management central staffs.

3.2 Key Managers and Loaned Personnel

A number of key managers and personnel at WBN have startup and operational experience from SQN and BFN, as well as other utilities. These managers and personnel have brought considerable experience and expertise to WBN. Examples include: a number of line and crew supervisors and members in Maintenance; a number of Reactor and Systems Engineers in Technical Support; a number of Construction Engineering Supervisors and General Foremen; a number of Operations personnel including SROs, ROs, AUOs, and off-shift Operations managers; and the Engineering and Modifications Manager, the Engineering Manager, and the Site Quality Manager.

3.3 Watts Bar Task Force and Watts Bar Program Team

The WBN Task Force was involved in monthly scheduled conferences with the Task Forces at SQN and BFN to ensure interface and consistency between the major initiatives being taken at each plant. This was integrated into the approaches being taken for the Special Programs developed for WBN.

The WBPT included members who were involved in the SQN and BFN restart efforts. The knowledge of the WBPT members allowed a significant level of SQN and BFN experience to be incorporated into the comprehensive plan for the completion, verification,and startup of WBN unit 1. The Chairman of the WBPT led the efforts to develop the Nuclear Performance Plan Volumes 2 and 3 for SQN and BFN, respectively.

3.4 Corrective Actions

The development of the Special Programs and CAPs described in Chapter III took into account the SQN and BFN special programs, the results achieved, and their applicability to WBN. Through this systematic review process, the applicable SQN and BFN experience and lessons learned have been reflected in the specific corrective actions for WBN. Examples include:

- DBVP CAP
- Cable Issues CAP
- Electrical Issues CAP
- Replacement Parts CAP
- Vendor Information CAP
- Heat Code Traceability CAP
- Prestart Test CAP
- MIC Special Program

3.5 Nuclear Experience Review Program

Enhancements in the NERP include the use of TVA and other utility experience when developing corrective or preventive action plans to address problems or issues at each of TVA's plants. This program will provide the long-term means by which TVA will obtain benefit from the experience gained within the nuclear industry, as well as experience shared among each of TVA's nuclear plants.

The NERP organization and program is discussed in Section 1.2.2 of this chapter.

3.6 Operator Training

The integration of lessons learned into the training of WBN operations personnel is discussed in Section 2.2 of this chapter.

VI

VI. OPERATIONAL READINESS

1.0 INTRODUCTION

It is not the intent of this WBNPP to address all licensing matters that will be required for fuel load. However, because it will provide additional confirmation of the implementation of the WBN organizational changes and corrective actions, the Operational Readiness Program is included in the WBNPP.

2.0 PURPOSE

The purpose of the WBN Operational Readiness Program is to ensure that operational prerequisites are complete, that all systems are in the required state of readiness, and that nuclear safety will be assured when WBN begins operation. This program will assess and evaluate the personnel, procedures, and programs of WBN site organizations and TVA corporate support organizations to verify their adequacy for fuel load and startup and their compliance with regulatory requirements and TVA commitments.

3.0 SCOPE

The scope of the program involves evaluating existing plant conditions and practices, and then implementing any changes or additions that are needed to achieve the required state of readiness. The five principal elements of the program are as follows:

- Performance objective self-assessment for each site organization
- Completion of commitments, including CAPs and Special Programs
- System Pre-Operability Checklist (SPOC) completion
- Master Startup Operations/Testing Checklist
- Program for Assurance of Completion and Assurance of Quality (PAC/AQ) oversight of above four elements

Much of the WBNPP discusses completion and verification of design and construction work. These completion and verification actions are essential prerequisites to some of the later activities in the Operational Readiness Program. They will be addressed in the Operational Readiness Program to the extent that is necessary to assure operations-related activities can proceed.

4.0 METHOD

The Operational Readiness Program will begin with the development of a self-assessment plan for each organization, based on INPO and Industry performance objectives. The second element will include a listing of commitments from Appendix E, CAPs, and Special Programs; assignment of commitments; and documentation requirements for closure. The third element of the WBN Operational Readiness Review (ORR) involves preparation and implementation of procedures that establish checklists or formal verification to ensure issues that could impact system operability or plant safety are identified and resolved prior to startup. This includes requirements for completion of a SPOC. The fourth element is the Master Startup Operations/Testing Checklist. The fifth and last element of the ORR is the PAC/AQ oversight of ORR activities, conducted by senior personnel with plant experience from outside of WBN, supplemented when necessary by personnel with special expertise and industry experience from outside of TVA.

5.0 IMPLEMENTATION

5.1 Operational Readiness Self-Assessment

The initial programmatic element that will be used to achieve operational readiness at WBN will be to develop a self-assessment plan for each site organization. Using recommended practices from INPO and other industry sources, and TVA experiences, a detailed inspection plan based on organizational performance objectives will be developed.

The self-assessment plan will be based primarily on guidance from INPO using the following documents:

- Performance Objectives and Criteria for Operating and Near-Term Operating License Plants, INPO 90-015, Institute of Nuclear Power Operations, August 1990 (Ref. 125).

- Performance Objectives and Criteria for Corporate Evaluations, INPO 90-020, Institute of Nuclear Power Operations, November 1990 (Ref. 126).

The self-assessment plan will also draw from specific TVA lessons learned from the SQN and BFN ORRs and specific lessons learned at WBN.

The self-assessment will evaluate key performance objectives, which are necessary to ensure that WBN site organizations and TVA corporate support organizations function effectively and are prepared for plant fuel load, startup, and power operation. In general, the self-assessment will concentrate on those plant work tasks, procedures, training, and personnel that are directly involved in after-fuel-load activities such as startup, plant operation, and meeting nuclear safety requirements. A portion of the self-assessment will coincide with hot functional testing, since this is representative of many of the operational activities that will occur after fuel load. Also, hot functional testing provides an opportunity to observe "hands-on" training of personnel and "proof-testing" of plant operating and test procedures.

The specific performance areas that will be assessed during the self-assessment will include:

- Plant Organization and Responsibilities
- Plant Administrative Controls
- Conduct of Operation
- Maintenance
- Technical Support
- Personnel Training and Qualifications
- Radiological Controls
- Chemistry
- Emergency Preparedness
- Prestart Test Program
- Preoperational Testing
- Power Ascension Testing
- Effects of Prolonged Equipment and System Layups
- Inservice Inspection
- Surveillance Testing
- Configuration Control
- Housekeeping and Plant Appearance
- Operating Experience Review
- Outage Management
- Industrial Safety
- Work Controls
- Performance Monitoring

Within each of the performance areas listed above, the self-assessment will determine if key objectives, such as the following, have been met:

- Staffing is adequate to support safe and reliable operation of the plant.

- Procedures are adequate to support safe and reliable operation.
- Supervisory involvement in the activities of subordinates is sufficient to ensure satisfactory performance of work activities.
- Training and qualification have been completed and are adequate for personnel to perform their assigned duties.
- Appropriate types of performance goals and criteria have been established.
- These established criteria, if satisfied, will ensure operational readiness.
- A consistent and reliable process is used to assess the impact of all identified deficiencies.
- Planned corrective actions for existing deficiencies are adequate.
- Readiness is assured by final verification that all performance goals and criteria have been met.

5.2 Completion of Commitments

The WBNPP describes the programmatic elements of WBN's recovery plan. Implementation of the corresponding commitments from the WBNPP represents a substantive achievement in completion of activities required for startup. This part of the self-assessment includes the following:

- Listing of commitments from Appendix E, CAPs, and Special Programs
- Assignment of commitments
- Criteria for closure or implementation of WBNPP
- Documentation of implementation or closure
- Exceptions and justification for startup with exceptions

5.3 System Pre-Operability Checklist (SPOC) Completion

The SPOC involves preparation and implementation of procedures that establish checklists or formal verification to ensure issues that could impact system operability or plant safety are identified and resolved prior to startup. The SPOC includes verifying the completion status of items affecting a system in the following areas:

- Operations
- Testing
- Modifications
- Maintenance
- Licensing
- Procedures
- Design
- System Configuration

5.4 Master Startup Operations/Testing Checklist

The Master Startup Operations/Testing Checklist includes the following:

- Fuel Load Prerequisite Checklist (Prior to fuel load)
- Startup Prerequisite Checklist (Prior to initial criticality)
- Master startup instructions
- Management assessments at power plateaus

In conjunction with the various plant activities that will be performed before fuel load and startup such as the Prestart Test Program (Chapter III, Section 2.12) and the Preoperational Test Program (FSAR Chapter 14), each WBN organization will identify which of its hardware-related activities must be completed before either fuel load or startup. These completion activities will be used to prepare a startup prerequisite checklist that consolidates hardware operability issues such as the following:

- Work Request Backlog
- Clearances Outstanding
- Modification Status
- Temporary Alteration Control Forms (TACFs) Outstanding
- Surveillance Instructions
- Preventive Maintenance Packages Outstanding
- Instrumentation Availability
- Nonconforming Conditions and CAQs Outstanding
- Primary and Secondary Chemistry Controls
- Prestart Test Program (any open items that still exist after completion of the Prestart Test Program documentation packages described in Chapter III, Section 2.12)

This approach will identify responsible managers and provide a structured signoff system attesting to satisfactory completion of each item. Checklist completion will be reviewed before making decisions to load fuel and, subsequently, to begin a reactor startup.

In addition to checklist signoffs, system operability will require completion prior to fuel load and startup of applicable General Operating Instructions, System Operating Instructions, and Preoperational and/or Startup Instructions. Other scheduling and tracking measures at an individual item level may be used to ensure appropriate system status before fuel load and startup.

5.5 PAC/AQ Oversight of Operational Readiness Program

The last element of the WBN Operational Readiness Program includes the PAC/AQ oversight of the line organizations' completion of activities to ensure that operational readiness has been achieved.

6.0 REPORTING

The following reports will be issued to describe the actions taken to investigate and to ensure the operational readiness of WBN:

- Findings and recommendations of the ORR evaluation
- Site Vice President's documentation of operational readiness based on resolution of the ORR evaluation findings and all other pertinent issues
- Documented completion of the startup prerequisite checklist

7.0 FUEL LOAD CERTIFICATION

A fuel load certification letter will be provided to NRC when TVA determines that the design, construction, testing, and preparation for operation of WBN unit 1 are substantially completed in accordance with the FSAR and other appropriate licensing documents. This letter will document TVA corporate management's approval to proceed with loading fuel.

8.0 NUCLEAR SAFETY REVIEW BOARD

The NSRB provides TVA corporate management with an independent viewpoint of nuclear industry standards and acceptable practices, as described in the CNPP, Section IV.E.5. This group will provide oversight review of the self-assessment evaluation and other stages of operational readiness development and implementation.

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VII. SCHEDULE

Chapter VII previously provided integrated project milestones for major corrective actions. The information formerly provided in this chapter has been deleted in light of the ongoing monthly schedule reviews between TVA and NRC at WBN.

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53. U. S. Nuclear Regulatory Commission, Letter from S. C. Black, Assistant Director for Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation of the Watts Bar Unit 1 Corrective Action Program (CAP) Plan for Equipment Seismic Qualification (TAC 71919). September 11, 1989.

54. U. S. Nuclear Regulatory Commission, Letter from S. Black, Assistant Director for Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Corrective Action Program (CAP) for Fire Protection. September 7, 1989.

55. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Revision to Corrective Action Program (CAP) Plan for Fire Protection. March 28, 1990.

56. U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, NUREG-0847, Supplement No. 6, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, Tennessee Valley Authority. April 1991.

57. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Revision to Corrective Action Program (CAP) Plan for Hanger and Analysis Update Program (HAAUP). June 29, 1989.

58. U. S. Nuclear Regulatory Commission, Letter from S. C. Black, Assistant Director for TVA Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation of the Watts Bar Corrective Action Program (CAP) Plan for Hangar and Analysis Update Program (TAC No. R00512). October 6, 1989.

59. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Revision to Corrective Action Program (CAP) Plan for Heat Code Traceability. June 26, 1989.

60. U. S. Nuclear Regulatory Commission, Letter from B. D. Liaw, Director, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: NRC Inspection Report Nos. 50-390/89-09 and 50-391/89-09. September 20, 1989.

61. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Revision to Corrective Action Program (CAP) Plan for Heat Code Traceability. September 21, 1989.

62. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Heat Code Traceability Corrective Action Program (CAP) Completion. July 31, 1990.

63. Tennessee Valley Authority, Heat Code Traceability Corrective Action Program Plan Final Report: Resolution of Material Traceability for Piping Issues, Watts Bar Nuclear Plant, February 9, 1990.

64. U. S. Nuclear Regulatory Commission, Letter from B. D. Liaw, Director, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: NRC Inspection Report Nos. 50-390/90-02 and 50-391/90-02. March 15, 1990.

65. U. S. Nuclear Regulatory Commission, Letter from P. S. Tam, Senior Project Manager, Division of Reactor Projects, Office of Nuclear Reactor Regulation, to D. A. Nauman, Senior Vice President, Nuclear Group (TVA). Subject: Watts Bar Unit 1 - CAP on Heat Code Traceability (TAC 71920). March 29, 1991.

66. U. S. Nuclear Regulatory Commission, Letter from S. Black, Assistant Director for TVA Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation of the Watts Bar Corrective Action Program (CAP) Plan for Safety-Related Heating, Ventilation, and Air Conditioning (HVAC) Duct and Duct Supports (TAC No. R00510). October 24, 1989.

67. Tennessee Valley Authority, letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Revision to Corrective Action Program (CAP) Plan for Instrument Lines. June 27, 1989.

68. U. S. Nuclear Regulatory Commission, Letter from S. C. Black, Assistant Director for TVA Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation of the Watts Bar Unit 1 Corrective Action Program (CAP) Plan for Instrument Lines (TAC 71918). September 8, 1989.

69. U. S. Nuclear Regulatory Commission, Letter from K. P. Barr to S. A. White (TVA). Subject: Initial Test Program for Watts Bar - Unit 1. February 3, 1988.

70. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Revision to Corrective Action Program (CAP) Plan for Prestart Test Program. June 26, 1989.

71. U. S. Nuclear Regulatory Commission, Letter from S. Black, Assistant Director for TVA Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation of the Watts Bar Unit 1 Corrective Action Program (CAP) for Prestart Test Program (TAC 71924). October 17, 1989.

72. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Unit 2 - Revision to Corrective Action Program (CAP) Plan for Quality Assurance (QA) Records. June 27, 1989.

73. U. S. Nuclear Regulatory Commission, Letter from S. C. Black, Assistant Director for TVA Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation of the Watts Bar Corrective Action Program (CAP) Plan for QA Records (TAC 71923). December 8, 1989.

74. Tennessee Valley Authority, Letter from M. O. Medford, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Unit 1 - Quality Assurance (QA) Records Additional Review. January 28, 1991.

75. U. S. Nuclear Regulatory Commission, letter from S. Black, Assistant Director for Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Corrective Action Plan (CAP) Plan for Quality Assurance List (Q-List). September 11, 1989.

76. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Quality Assurance List (Q-List) Corrective Action Program (CAP) Plan, Revision 3. July 20, 1990.

77. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Corrective Action Program (CAP) Plan for Q-List. November 7, 1990.

78. U. S. Nuclear Regulatory Commission, Letter from P. S. Tam, Senior Project Manager, Division of Reactor Projects, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Unit 1 - Corrective Action Program Plan on the Q-List (TAC 63590). January 23, 1991.

79. U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, NUREG-0847, Supplement No. 5, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, Tennessee Valley Authority. November 1990.

80. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Revision to Corrective Action Program (CAP) Plan for the Replacement Items Program (Piece Parts). August 7, 1989.

81. U. S. Nuclear Regulatory Commission, Letter from S. C. Black, Assistant Director for Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation of the Watts Bar Unit 1 Corrective Action Program (CAP) Plan for Replacement Items Program (Piece Parts) (TAC 71922). November 22, 1989.

82. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Unit 1 - Revision to Corrective Action Program (CAP) Plan for Replacement Items Program (Piece Parts). July 31, 1990.

83. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Revision to Corrective Action Program (CAP) Plan for Seismic Analysis. June 29, 1989.

84. U. S. Nuclear Regulatory Commission, Letter from S. C. Black, Assistant Director for Projects, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Nuclear Plant Unit 1 - Corrective Action Program (CAP) for Seismic Analysis. September 7, 1989.

85. U. S. Nuclear Regulatory Commission, Letter from B. D. Liaw, Director, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: NRC Inspection Report Nos. 50-390/89-21 and 50-391/89-21. May 10, 1990.

86. U. S. Nuclear Regulatory Commission, Memorandum from L. B. Marsh, Chief, Mechanical Engineering Branch, Division of Engineering Technology, to P. S. Tam, Senior Project Manager, Division of Reactor Projects. Subject: On-Site Audit on Watts Bar Seismic Analysis Corrective Action Program Plan, TAC No. R00514. October 10, 1990.

87. Tennessee Valley Authority, Letter from M. J. Ray, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Revision to Corrective Action Program (CAP) Plan for Seismic Analysis. May 9, 1990.

88. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Revision to Corrective Action Program (CAP) Plan for Vendor Information. March 15, 1990.

89. U. S. Nuclear Regulatory Commission, Letter from P. S. Tam, Senior Project Manager, Project Directorate, Division of Reactor Projects, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Unit 1 - Volume 4 Nuclear Performance Plan (NPP), Chapter III, Vendor Information (TAC 79121). September 11, 1990.

90. Tennessee Valley Authority, Letter from O. D. Kingsley, Senior Vice President, Nuclear Power, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Corrective Action Program (CAP) Plan for Welding. May 12, 1989.

91. U. S. Nuclear Regulatory Commission, Letter from B. D. Liaw, Director, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President (TVA). Subject: Inspection Report Nos. 50-390/89-04 and 50-391/89-04. August 9, 1989.

92. U. S. Nuclear Regulatory Commission, Letter from B. D. Liaw, Director, TVA Projects Division, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power (TVA). Subject: NRC Inspection Report Nos. 50-390/90-04 and 50-391/90-04. May 17, 1990.

93. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Welding Corrective Action Program (CAP) Program - Revisions to CAP Plan and Phase I Weld Report. July 31, 1990.

94. U. S. Nuclear Regulatory Commission, Letter from P. S. Tam, Senior Project Manager, Division of Reactor Projects, Office of Nuclear Reactor Regulation, to D. A. Nauman, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Unit 1 - Review of Two Submittals Regarding the Welding CAP, Dated July 31, 1990 (TAC 72106). March 5, 1991.

95. Tennessee Valley Authority, Letter from M. B. Whitaker for R. L. Gridley to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Concrete Quality Evaluation. April 16, 1987.

96. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Completion of the Concrete Quality Evaluation. August 31, 1990.

97. U. S. Nuclear Regulatory Commission, Letter from P. S. Tam, Senior Project Manager, Division of Reactor Projects, Office of Nuclear Reactor Regulation, to D. A. Nauman, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Unit 1 - Supplemental Safety Evaluation of the Special Program on Containment Cooling (TAC 77284). May 21, 1991.

98. Tennessee Valley Authority, Letter from L. M. Mills to A. Schwencer (NRC). Subject: Findings of PDA of WBN Control Room. January 13, 1981.

99. U. S. Nuclear Regulatory Commission, NRC Staff's Control Room Design Review Report. June 1, 1981.

100. Tennessee Valley Authority, Letter from R. L. Gridley, Director of Nuclear Licensing and Regulatory Affairs to NRC. Subject: Watts Bar Nuclear Plant (WBN) Detailed Control Room Design Review (DCRDR) Summary Report. October 2, 1987.

101. Tennessee Valley Authority, Letter from R. L. Gridley, Manager Nuclear Licensing and Regulatory Affairs to NRC. Subject: Watts Bar Nuclear Plant (WBN) Detailed Control Room Design Review (DCRDR) Summary Report. March 7, 1989.

102. U. S. Nuclear Regulatory Commission, Letter from S. C. Black, Assistant Director for Projects, TVA Projects Division to O. D. Kingsley (TVA). Subject: Watts Bar Nuclear Plant Detailed Control Room Design Review (TAC No. 63655). April 28, 1989.

103. Tennessee Valley Authority, Letter from R. L. Gridley to B. J. Youngblood (NRC). Subject: Summary Status Update Report TVA's Compliance to 10 CFR 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," Watts Bar Nuclear Plant Unit 1. September 30, 1986.

104. Tennessee Valley Authority, Letter from M. J. Burzynski for E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Unit 1 Environmental Qualification (EQ) and Mechanical Equipment Qualification (MEQ) Projects. April 30, 1991.

105. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Response to Concerns in NRC Safety Evaluation Report (SER) for WBN Nuclear Performance Plan (NPP) Volume 4 - Master Fuse List. July 31, 1990.

106. U. S. Nuclear Regulatory Commission, Letter from P. S. Tam, Senior Project Manager, Division of Reactor Projects, Office of Nuclear Reactor Regulation, to O. D. Kingsley, Senior Vice President, Nuclear Power. Subject: Watts Bar Unit 1 - Special Program on Master Fuse List (TAC 76973). February 6, 1991.

107. Tennessee Valley Authority, Letter from E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Response to NRC Interim Supplemental Safety Evaluation Report Concerning the Watts Bar Nuclear Performance Plan on the Master Fuse List Program. May 31, 1991.

108. U. S. Nuclear Regulatory Commission, Letter from E. G. Andensam to H. G. Parris (TVA). Subject: Environmental Qualification of Safety-Related Mechanical Equipment Located in Harsh Environment Areas for the Watts Bar Nuclear Plant, Units 1 and 2. April 1, 1983.

109. Tennessee Valley Authority, Letter from L. M. Mills to E. G. Adensam, Chief Licensing Branch No. 4 Division of Licensing (NRC). Subject: Equipment Qualification of Safety Related Mechanical Equipment in Harsh Environment. May 19, 1983.

110. Tennessee Valley Authority, Letter from M. J. Burzynski for E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Microbiologically Induced Corrosion Program Report. February 26, 1991.

111. Tennessee Valley Authority, Letter from R. L. Gridley to NRC. Subject: Radiation Monitoring System, Second Interim Report. November 23, 1987.

112. U. S. Nuclear Regulatory Commission, Memorandum from L. B. Marsh, Chief, Mechanical Engineering Branch, Division of Engineering Technology, to P. S. Tam, Project Directorate II-4, Division of Reactor Projects - I/II (NRC). Subject: On-Site Audit on Watts Bar Seismic Analysis Corrective Action Program Plan, TAC No. R00514. October 10, 1990.

113. Tennessee Valley Authority, Quality Assurance Program Description for Design, Construction, and Operation, Topical Report - TVA-TR75-1, Revision 10, July 28, 1988.

114. Tennessee Valley Authority, Letter from R. L. Gridley, Manager Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Units 1 and 2 Use-As-Is and Repair Dispositions for Construction Nonconformance Reports - WBRD-50-390/87-05 and WBRD-50-391/87-05 Final Report. September 14, 1988.

115. Tennessee Valley Authority, Letter from E. D. Fuller, WBPT Chairman, to D. A. Nauman, Senior Vice President, Nuclear Power (TVA). Subject: Watts Bar Program Team (WBPT) Closure Report. May 10, 1991.

116. Tennessee Valley Authority, Letter from D. A. Nauman to NRC. Subject: Watts Bar Nuclear Plant (WBN) - Discontinuance of the Watts Bar Program Team. August 5, 1991.

117. U. S. Nuclear Regulatory Commission, Letter from S. Black to O. D. Kingsley (TVA). Subject: Request for Additional Information Regarding Corrective Action Program (CAP) Plan for Containment Isolation - Watts Bar Nuclear Plant Units 1 and 2. February 15, 1989.

118. U. S. Nuclear Regulatory Commission, Letter from S. Black to O. D. Kingsley (TVA). Subject: Further Clarification Regarding Request for Additional Information Dated February 12, 1989 for Containment Isolation - Watts Bar Nuclear Plant Units 1 and 2. March 15, 1989.

119. Teleconference dated February 14, 1989 between R. Aulack of NRC and J. H. Young of WBN Licensing regarding Containment Isolation CAP (No meeting minutes were issued).

120. Tennessee Valley Authority, Memorandum to D. E. McCloud from T. W. Horning documenting minutes of February 17, 1989 meeting titled, "Watts Bar Nuclear Plant (WBN) - Minutes of Teleconference with the Nuclear Regulatory Commission (NRC) on Containment Isolation (CI)." February 22, 1989.

121. Tennessee Valley Authority memorandum to D. E. McCloud from J. H. Young documenting minutes of April 10, 1989 meeting titled, "WATTS BAR NUCLEAR PLANT (WBN) - Minutes of April 10, 1989 Teleconference with the Nuclear Regulatory Commission (NRC) on Containment Isolation (CI)."

122. Tennessee Valley Authority, Letter from O. D. Kingsley, Jr., to NRC. Subject: Transmittal of Watts Bar Nuclear Plant - Containment Isolation - Response to NRC's Request for Additional Information. May 12, 1989.

123. U. S. Nuclear Regulatory Commission, Letter from S. C. Black for F. J. Hebdon, Director, Project Directorate II-4, Division of Reactor Projects - I/II, Office of Nuclear Reactor Regulation, to D. A. Nauman, Senior Vice President, Nuclear Power (TVA). Subject: Safety Evaluation on the TVA Corrective Action Plan Deviation Process and Supplement to Safety Evaluations on the Tennessee Valley Authority Employee Concerns Subcategory Reports - Browns Ferry Nuclear Plant, Units 1, 2, and 3 and Sequoyah Nuclear Plant, Units 1 and 2 (TAC Nos. 76941, 76942 and 76944). April 15, 1991.

124. Tennessee Valley Authority, Letter from M. J. Burzynski for E. G. Wallace, Manager, Nuclear Licensing and Regulatory Affairs, to NRC. Subject: Corporate Nuclear Performance Plan (CNPP). April 5, 1991.

125. Institute of Nuclear Power Operations, Performance Objectives and Criteria for Operating and Near-Term Operating License Plants, INPO 90-015, August 1990.

126. Institute of Nuclear Power Operations, Performance Objectives and Criteria for Corporate Evaluations, INPO 90-020, November 1990.

127. Tennessee Valley Authority, Letter from J. H. Garrity, Vice President, Watts Bar Nuclear Plant, to NRC. Subject: Watts Bar Nuclear Plant (WBN) Units 1 and 2 - Cable Issues Corrective Action Program (CAP) Plan - Results of the Low-Risk Cable Tests and Inspections Performed to Resolve the Pullby Issue. August 22, 1991.

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APPENDIX A

TVA RESPONSE TO NRC REQUEST FOR INFORMATION UNDER 10 CFR 50.54(F) ON WATTS BAR NUCLEAR PLANT

This appendix provides TVA's response to NRC's request for information in Section D of Enclosure 2 of the 10 CFR 50.54(f) letter of September 17, 1985. RC requested TVA to furnish this information in order to address the three general concerns identified on page 2 of the subject letter. This WBNPP addresses in detail the issues contained in each of the Section D questions. The brief answers given below refer to those portions of this WBNPP which contain more detailed information. In addition, Chapter V, Section 1.2.2 discusses improvements in the WBN site licensing organization to address the category 3 Systematic Assessment of Licensee Performance rating regarding WBN licensing activities.

Question 1:

On May 30, 1985, we asked that you provide your compilation of all reviews conducted at TVA that demonstrates your conclusion regarding how the Watts Bar facility meets its licensing commitments. Your response of June 21, 1985, did not address this question in sufficient detail for NRC to evaluate.

Therefore, provide a compilation and summary of Quality Assurance Program activities that have occurred during the construction of Watts Bar, Unit 1. Provide a description of how the Quality Assurance Program activities that addressed concerns identified by the NRC in inspection reports and SSER #1, by the Watts Bar Integrated Design Verification Program, through the 1982 TVA Action Plan, and in other programmatic reviews such as the NSRS Review of Watts Bar, the United Engineers Design Verification Program Review, and the Theodore Barry and Associates' Review of OEDC. The summary and compilation should provide details sufficient for NRC to evaluate your conclusion that the Quality Assurance Program for construction of Watts Bar Unit 1 has been effective and comprehensive.

Response:

Chapter II, Section 2, and Appendix B of this WBNPP provide a description of the scope, findings, and corrective actions related not only to the reviews identified above by NRC, but also to significant additional reviews related to the design, construction, and quality assurance activities at WBN. Overall, the issues identified in these reviews indicated weaknesses related to definition of problem scope, root cause analyses, implementation of corrective action, and ineffective recurrence control. The WBN Task Force, established in March 1986, represented TVA's initial effort to consolidate and address these weaknesses in an integrated plan. Chapter I and Chapter II, Sections 2.6 and 3, describe the WBN Task Force efforts to address the weaknesses identified in the above reviews.

Beyond the work of the WBN Task Force, TVA recognized the need to perform an overall evaluation of plant design and construction to provide reasonable assurance that problems had been discovered and that adequate corrective actions had been developed to address them. To accomplish this, the analysis had to go beyond those problems which had been identified in previous reviews. The Systematic Evaluation, described in Chapter II, Section 5, afforded TVA a comprehensive review of plant design and construction, including quality assurance related aspects which had theretofore only been analyzed on a case-by-case basis. Chapter I and Sections 3 and 4 of Chapter II, describe the WBPT responsibility for carrying out the Systematic Evaluation. Through the Systematic Evaluation, which included a review of the various Special Programs and CAPs (Chapter III), the VSR (Chapter II, Section 6), the ECSP (Chapter II, Section 2.4), and CAQRs (Chapter II, Section 2.2), TVA has concluded that upon completion of the corrective actions to resolve identified issues, there will be reasonable assurance that WBN design and construction meet licensing requirements and TVA commitments.

TVA has also significantly strengthened its organization and management as described in the CNPP and Chapter V of this WBNPP. These changes, including a significant restructuring of TVA's Quality Assurance organization, provide additional assurance that the problems which were identified in the above-mentioned reviews have been and will be effectively and comprehensively addressed.

Question 2:

Provide your disposition of all issues which you have determined need to be addressed prior to low power licensing and prior to full power licensing.

Response:

The WBNPP provides the plan of action necessary to demonstrate that WBN has been designed and constructed in accordance with applicable regulatory requirements and TVA commitments. As such, the corrective actions to resolve identified issues are described in Chapter III. The specific plans for corrective actions described in the WBNPP, together with the corrective actions being tracked within the TVA corrective action process, provide for the disposition of all identified issues which need to be addressed for licensing.

It is not intended that the WBNPP address all licensing matters that will be required for low-power and full-power licensing. Those remaining licensing activities have been addressed in previous safety evaluations or will be addressed in accordance with routine NRC licensing practices. Consequently, TVA's commitment to address disposition of initial draft WBN license conditions will be deferred for resolution as a routine licensing activity.

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APPENDIX B

INDEPENDENT REVIEWS

This appendix briefly describes the scope, findings, and corrective actions of the more significant independent reviews performed at TVA related to design, construction, and QA activities. In addition to the reviews conducted at WBN, those reviews at SQN, BFN, and BLN (Bellefonte Nuclear Plant) that could generically affect WBN are also described.

Most of these independent reviews were conducted before TVA's reorganization of its Nuclear Power program and the Systematic Evaluation performed at WBN to ensure identification of nonconforming issues and development of adequate corrective actions. Indeed, many organizational and programmatic changes have been made to significantly improve the performance of the TVA nuclear power organization and to resolve more thoroughly many of the technical issues identified through these reviews. These actions are described in the CNPP and in various CAP plans submitted to the NRC and Special Programs described in Chapter III.

As part of the Systematic Evaluation, the WBPT has reviewed the findings resulting from these independent reviews and concluded that the completed or planned corrective actions have addressed the findings adequately.

B.1 Theodore Barry and Associates (TB&A), United Engineers and Constructors (UE&C), and Duke Power Reviews

Beginning in 1978, TVA employed TB&A to conduct a review of the Office of Engineering Design and Construction (OEDC) operations to determine how effectively resources were being utilized; to determine if adequate and effective policies and procedures were in place and being followed; to review, evaluate, and measure performance relative to management practices; to determine areas where management and operating practices could be improved and cost reductions and/or schedule improvements realized; to identify functions being performed satisfactorily; and to make practical and cost effective recommendations. Most of TB&A's recommendations were related to improvements in cost and schedule performances. Toward this, the TB&A review determined the need for an organizational restructuring around a central project manager and identified the need for several improvements in organization practices and procedures. As a result of this review, TVA eventually adopted the central project manager concept and took steps to improve organization practices and procedures. A followup review by TB&A was performed to determine whether their recommendations had been implemented appropriately. TB&A concluded from this review that OEDC had implemented, or was in the process of implementing, most of the recommendations. Even where OEDC did not accept a TB&A recommendation, improvement steps were taken to meet the intent of the recommendations.

In late 1978 through February 1979, UE&C reviewed Engineering Design (EN DES) design verification methods, practices, and procedures, and compared

them with regulatory requirements and guides for the design of safety-related systems and structures. The comparison was also made with similar practices employed throughout the industry. The UE&C review found that TVA's design verification methods were generally as good as those of other architect-engineer organizations, but noted the need for a better definition of independence of reviewers or checkers. This eventually led to the inclusion of reviewer independence requirements in many of the current Nuclear Engineering Procedures (NEPs).

From October through November 1982, Duke Power Company aided TVA in a joint review of design and construction programs for BLN. The evaluation covered the program and procedures for, and implementation of, design controls and the performance of construction activities. The evaluation ultimately had generic implications for WBN in that the review determined that the organizational structure and management commitment to quality was acceptable but noted deficiencies in procedures defining responsibility, CAQ resolution, training, and inspection. This review resulted in the separation of QC from the construction and operation organizations and more extensive training programs.

B.2 Nuclear Safety Review Staff (NSRS) Programmatic Reviews of OEDC and QA Organization

Following the TMI-2 accident, the TVA Board of Directors established an independent group, reporting to the Board, that was charged with responsibility for reviewing and investigating issues that might affect the safety of TVA's nuclear plants. This group was designated the NSRS. The charter for the NSRS was broad, conferring on the group the authority to look into any matter relating to nuclear safety, and to recommend resolutions to issues identified.

The TVA NSRS performed several independent reviews to examine WBN activities during its design and construction phase. Only the programmatic reviews of the OEDC and the QA organization are discussed here. In 1981, the NSRS reviewed the OEDC written programs to determine if they satisfied TVA policy, commitments, and regulatory requirements. The NSRS also reviewed the programs to determine whether they were being implemented adequately by knowledgeable and qualified individuals. In 1982, a similar review was conducted that also examined whether personnel were aware of their responsibilities, and if the training program was adequate to assure compliance with the QA program. An in-depth review of the Office of Quality Assurance (OQA), its organization, internal operation, and implementation of the corrective action program was performed in 1983.

In general, these reviews determined that written programs were established and implemented, but identified areas that needed management attention and improvement. Inadequate control of QA/QC procedures; inadequate drawing information system updates; lack of EN DES review of purchase requisitions; and concerns with NCRs regarding initiation, document changes, and significance definition were reported as findings in the 1981 review. In 1982, findings reported by the NSRS identified

problems in the annual audit of QA areas, alternative programs for exceptions to Regulatory Guides, the total scope of OEDC QA program, Q-List, design control, vendor documents, records accountability, ASME personnel qualifications, construction QA audits, QA procedures, and training. The 1983 review indicated that improvements were made in the QA program by management support of a strong program, separation of QA from the line functions, assignment of QA responsibilities to one organization, and the capability of providing feedback to top-level management. Findings were also identified relative to the OQA: ineffective and inefficient internal communication and working relationships; ineffective communications with line management and the NRC; inadequate staffing of OQA; and conflicts between proposed QA requirements and the intent of the verification process.

As a result of the NSRS reviews conducted in 1981, the OQA was established and program changes were implemented that included procedural changes and retraining of personnel. The 1982 NSRS major management review resulted in additional program changes and retraining of personnel where required. Findings associated with the 1983 NSRS review of OQA prompted the establishment of the Division of Quality Assurance in August 1984.

In December 1985, NSRS presented its individual Perceptions to NRC regarding WBN status. Appendix C describes the manner in which these Perceptions are addressed by the completed or planned corrective actions and the ECSP.

B.3 NRC Region II Inspections of the TVA QA Program

The NRC performed several inspections of TVA QA programs during WBN's design and construction phase. From December 1981 through January 1982 and again in June 1982, the NRC reviewed OEDC's corrective action systems and the implementation of OEDC's 1982 Action Plan for Quality Improvement, and examined the management and staff functions in OQA's Design, Construction, and Operations Branches. In January 1983, a special NRC regional quality assurance team reviewed the overall TVA management control of the QA Program requirements involving design, construction, and operation activities. In January 1985, the NRC reviewed activities in the areas of regulatory requirements, auditing, corrective action, timely issuance of audit reports and site responses, audit scheduling and followup, and auditor training.

The findings of the 1981-1982 review of OEDC's corrective action systems identified programmatic deficiencies in several areas, including design control, construction, and QA. The failure to assure the identification or prompt correction of certain significant CAQs was identified. A failure to delineate the authority and duties of organizations responsible for the transfer of certain safety-related components from OEDC to Power was also identified. The NRC's review of OEDC's 1982 Action Plan found that the plan needed to include further design verification of previous work. The 1983 review of management and staff function in OQA's Design, Construction and Operations Branches identified

failure to ensure that audit findings were completely resolved, internal audits on operating plants were not being forwarded to appropriate management in a timely manner, audited organizations failed to respond within 30 days, lead auditors were being certified improperly, auditor qualification records were not maintained, and listing of persons contacted during an audit was not maintained. The January 1985 review indicated a failure to audit all applicable design and construction elements. It also indicated failure to resolve audit findings adequately and in a timely manner. Several audit findings were still open several years after the audit.

In response to the findings of the reviews, TVA implemented various corrective actions. For the 1981-1982 review, programmatic corrections were established to address violations. A corporate QA organization was established to evaluate the adequacy of actions required to prevent recurrence of significant NCRs. Further action proceeded with the implementation of OEDC's 1982 Action Plan for Quality Improvement. A policy statement emphasizing timeliness and responsiveness to CAQs was issued. The OEDC Project Manager position for WBN was established to oversee design and construction activities. Site procedures and training were enhanced and a computer-based system was implemented to improve scheduling and tracking of outstanding work and nonconformances. In response to the 1983 review, steps were taken to close all overdue and open audits and emphasis was placed on procedural requirements for issuance and response of audit findings. Procedures were reviewed and revised as required for auditor training, qualification of auditors, and persons contacted during audits. In response to the 1985 review, trends on the timeliness of corrective action were reported and discussed monthly by TVA top management, quarterly corrective action reviews were performed, and escalation of audit deviations not properly resolved was required. Guidance for problem escalation to management was provided and an audit plan that addressed each organizational element was issued.

B.4 INPO Evaluations

During the 1980s, INPO conducted several evaluations of TVA corporate performance, as well as the performance at all TVA's nuclear plants. In this section, the corporate evaluations and the construction project evaluations (WBN and BLN) are discussed.

The BLN evaluation was conducted by INPO in 1984. A similar evaluation was conducted at WBN in 1985. The finding from the BLN evaluation, that had a generic applicability to WBN related to the need for strengthening the QC inspection program, procedures, audits, records control, and the electrical program. The WBN evaluation in 1985 identified the need for improving recurrence control of identified issues, better communication among project groups, preventive maintenance, completion of calculations, and management of system completion.

The 1984 BLN evaluation resulted in further procedural upgrades and the implementation of a more extensive records management system at WBN. The WBN evaluation in 1985 resulted in an ongoing effort to improve design calculations and to improve preventive maintenance activities.

Two corporate evaluations of TVA were conducted by INPO, one in 1985 and the other in 1987. The 1985 corporate evaluation identified the absence of effective management and leadership from the top levels of the organization. The 1987 corporate evaluation identified a backlog of corrective actions requiring resolution and closeout. This evaluation also recommended that aspects of organizational restructuring be firmed up. The recommendations from these corporate evaluations are captured by the CNPP.

B.5 Black & Veatch Independent Design Verification

During 1982-84, Black & Veatch performed an independent design verification of design and construction of the Auxiliary Feedwater (AFW) system at WBN. The review resulted from a TVA commitment made to NRC in September 1982, to have an independent contractor perform a design and construction review of the AFW system. A number of instances were identified by this review where the licensing commitment and licensing bases were not satisfied. Through a formal process, TVA provided responses to the findings identified by Black & Veatch. Through this process and a followup resolution program undertaken in 1983-84, Black & Veatch closed all but three of the identified findings. The three open findings related to the assumptions made in the ampacity calculations, the expansion anchor baseplate design to address the NRC IE Bulletin 79-02, and peak broadening of response spectra used in the piping analysis. Based on this review, Black & Veatch concluded that, when completed, examined, and tested in accordance with the currently defined TVA program, the WBN unit 1 AFW system could reasonably be expected to perform its intended function, provided the findings identified were resolved satisfactorily.

Since Black & Veatch's conclusion was limited to the AFW system, TVA established a task force to assess the generic implications of the Black & Veatch findings to other WBN systems. The task force grouped those Black & Veatch findings that represented deviations from the licensing requirements into 25 categories. An evaluation of these 25 categories was performed by the task force and appropriate corrective actions were developed to resolve those with generic implications. The task force completed its effort in March 1984 and concluded that, based on the review and evaluations performed by Black & Veatch and TVA, there is reasonable assurance that the WBN facility, as designed and constructed, is capable of performing its safety functions.

The 25 categories of findings and three outstanding findings have been reviewed by the TVA line organization and the WBPT as part of the Systematic Evaluation, and it has been determined that completed or planned corrective actions adequately address these findings.

B.6 Duke Power Review of Pipe Stress Analysis

In August 1984, Duke Power Company reviewed engineering, construction, and QA activities related to certain piping and support programs at WBN and BLN. The review found that the TVA interpretation and implementation

of some code requirements, analysis, and design methods were conservative and restrictive. The review also found inadequate procedural control of field routed piping, inadequate understanding of ECN process by personnel, and inadequate training of personnel in the use of engineering judgment. As a result of this review, TVA evaluated design methods and revised design requirements. Improved training of personnel was also implemented. The Hanger and Analysis Update Program (HAAUP) was developed to consolidate pipe stress and support activities. This program is described in Chapter III, Section 2.8.

B.7 Management Analysis Company (MAC) Review of QA Program

From August through November 1984, TVA employed MAC to perform an in-depth oversight of the QA program. The review determined that ultimate authority for the QA program was fragmented and not clearly defined, and recommended that responsibility for site QA programs be transferred to the sites. As a result of this recommendation, TVA established the Division of Quality Assurance and shifted primary responsibility for site QA programs to the sites. Recommendations were also made to make procedures more effective and usable, to improve effectiveness of audit programs, and to improve the adequacy and timeliness of corrective actions. Actions were taken to address these recommendations by developing improved procedures and devoting greater management attention to the audit and corrective action programs.

B.8 BLN Electrical Evaluation

In September 1984, TVA initiated a review and evaluation of the Bellefonte Nuclear Project's electrical system. This review resulted from an INPO March 1984 assessment of the project in which INPO expressed concern for the adequacy of the electrical portion of the design and construction process. The focus of TVA's review was to determine the extent and validity of the general concern raised by INPO and to identify any additional corrective actions needed.

The TVA review resulted in 35 specific findings in the areas of Electrical and I & C design and construction. These findings were categorized into two basic areas: 1) a lack of definition of the minimum set of calculations and studies for the electrical system required to establish technical adequacy and the design basis; and 2) the inadequacies in the process to provide effective communication across discipline boundaries needed to ensure a quality product. These generic findings are addressed for WBN by the CNPP for the programmatic aspect and by the various corrective actions (e.g., the calculation activity of the DBVP and ESQ Program described in Chapter III) planned at WBN for the specific findings.

B.9 WESTEC Environmental Qualification Review

In 1985, a team of WESTEC Services, Inc. and TVA personnel performed a programmatic and technical review of TVA environmental qualification (EQ) activities and documentation to determine the degree of compliance to

10 CFR 50.49. The scope of the review included TVA's EQ program for BFN, SQN, and WBN plants. The inspection plan outlined five areas for review: identification of equipment on the EQ master list, EQ documentation, maintenance and surveillance, control and tracking, and procurement. The review entailed a vertical examination of EQ files as well as a horizontal review of programmatic aspects.

The review team made a total of 61 observations - 38 on BFN, 15 on SQN, and 8 on WBN. A management review was conducted to determine which of these observations at BFN and SQN were applicable to WBN, and corrective actions were identified. The EQ Special Program, described in Chapter III, Section 3.4, was initiated to scope and address necessary corrective actions resulting from this review. An EQ project manual was issued in February 1986 and the WBN EQ binders were issued in September 1986 to document and control equipment qualification. As part of the EQ Special Program, open items identified in these binders will be closed before fuel load with allowance for documenting specific exceptions for tasks which are dependent upon a particular plant made for completion.

B.10 Design Control Surveys

Beginning in August 1985, the Office of Engineering (OE) initiated a series of independent design control surveys of TVA operating plants. These surveys were initiated by OE management to assess the effectiveness of procedural upgrades implemented in June 1985. The first of the two 1985 surveys was conducted at BFN. This survey identified two principal findings related to the design control process: inadequate definition of the BFN basis of design baseline and a lack of engineering control on design-related activities. Both of these findings are addressed by the CNPP and the DBVP at WBN.
The second 1985 survey was conducted at SQN. This survey was conducted by Gilbert/Commonwealth, Inc., and addressed the newly issued Sequoyah Project Manual. The finding that had generic application to WBN was related to the timely preparation of as-constructed drawings in the configuration control program. This finding is addressed by the DBVP at WBN.

A third design control survey, also performed by Gilbert/Commonwealth, Inc., was conducted in 1986 as a followup to the 1985 survey. This survey evaluated the effectiveness of the design control process for changes made to the main and auxiliary feedwater (AFW) systems at SQN after receipt of an operating license. This survey addressed the modifications made to the main and AFW systems at SQN. The survey team identified 19 technical issues and 18 observations as a result of the review. The team concluded that, pending completion of the TVA action plan and resolution of open items, the modifications made to the main and auxiliary feedwater system will have maintained technical adequacy. The generic applicability of these issues was evaluated for WBN and appropriate corrective actions were defined for the applicable issues.

B.11 NRC IDI of SQN

In 1987, NRC performed an Integrated Design Inspection (IDI) at SQN to assess the adequacy of design and construction. The inspection focused on the essential raw cooling water (ERCW) system, although other systems/areas were covered where needed. The activities included examination of design, design basis, design procedures, records and inspection of the system as installed at the plant.
The IDI identified several areas of programmatic weaknesses in the SQN design process, as well as the specific discrepancies. The major programmatic weakness discovered by the team related to the technical adequacy of the structural calculations for safety-related buildings.

Across all disciplines, the IDI team found examples that indicated that TVA had reduced much of the design conservatism that normally exists in nuclear power plants. The sense of the IDI team was that TVA traded design margins off for increased engineering analysis. While this apparent design philosophy is not unacceptable, the reduced design margins result in a diminished capacity to accommodate initial design errors without requiring plant modifications.

The IDI team discussed one central theme that emerged during the discussions of the overall findings. This was that NE appeared to lack a system integration function. The design of a nuclear plant is complex in that many systems and components have multiple functions and interact with each other in ways that are not always obvious. In reviewing the IDI findings, it appeared that system interactions were not always considered.

As a result of the SQN IDI, specific CAQRs and generic concerns were identified and documented under TVA's CAQR process. Each issue was identified and evaluated, corrective action was determined, and root cause and preventive action were documented as a function of the CAQR process. This process also required an evaluation for generic applicability to WBN. Where findings were found applicable to WBN, these were (or will be) addressed by the corrective action programs in place at WBN.

C

APPENDIX C

NSRS PERCEPTIONS WITH REGARD TO WATTS BAR NUCLEAR PLANT

In December 1985, individual NSRS staff members expressed their perceptions regarding TVA's quality program and its compliance to Appendix B of 10 CFR 50. The perceptions were centered in the following 11 areas:

- Welding Program
- Electrical Cable
- Instrument Lines
- Construction Process
- Quality Records
- Quality Assurance
- Q-List
- Material Traceability
- Embedded Plate Load Control
- Nonconformance Reporting
- Design Control

The basis of the above perceptions was derived by the NSRS staff members from employee concerns and past NSRS reviews. These perceptions were that certain aspects of TVA's design, construction, and QA were weak.

In February 1986, TVA had begun taking corrective actions to ensure these perceptions were adequately resolved. The perceived areas of weakness were targeted for improvement and factored into the development of CNPP. Additionally, the ECSP was established to evaluate and resolve the specific employee concerns.

As noted below, these NSRS perceptions have also been targeted for resolution by the corrective actions and organizational and procedural improvements described in this WBNPP. Additionally, the ECSP has completed evaluations of the employee concerns in the various categories and, in doing that, addressed various aspects of the issues involved in the NSRS perceptions; see the attached index for a general cross-reference of NSRS perceptions to ECSP categories and subcategories. The attributes listed in the criteria column of this index are generally based on the description of the issues identified under each NSRS Perception in Ref. 1. Due to similarity or broadness of subject matter, the cross-reference, however, should not be construed to be all encompassing.

The following provides a cross-reference of these 11 areas to the sections of this WBNPP where the issues identified by the perceptions are addressed. A brief statement of the issues involved in each perception is also included. These statements are based on Ref. 1.

- As-Constructed welding program is indeterminate

NSRS staff stated in the referenced memorandum, "Several key elements that are vital to a welding program that will result in a quality product are unacceptable," and it concluded, "Due to a pervasive nature and magnitude of program problems in the area of welding, our conclusion is that the end product is indeterminate."

Chapter III, Section 2.18 provides a brief discussion of TVA's Welding CAP and the TVA Welding Project review. The Welding CAP, and the numerous reports submitted to the NRC, e.g., EG&G's Weld Evaluation Project reports (Ref. 2), TVA Welding Project's Phase I and Phase II reports (Refs. 3 and 4), describe TVA's investigation of WBN welding activities as well as results to date of the completed actions.

- Electrical cable present qualification condition is indeterminate

NSRS staff stated:

> "Due to the many substantiated concerns regarding cables, it has become obvious that many cables have been bent, stretched, cut, and possibly crushed during the process of installing them. In fact, some were subjected to so much tension they broke during the pulling process. It is therefore obvious that we have exceeded the manufacturer's 'normal' mechanical stress values during the installation process. This being the case, one can only conclude that the cables no longer meet the requirements of IEEE Standard 383-1974. Therefore, the plant's ability to withstand a DBE is indeterminate...Two other problems noted in this review concerned lack of cable tray separation and potential heating of cable due to Vimasco coating." (Ref. 1).

Chapter III, Sections 2.1 and 2.5 provide a discussion of Cable Issues and Electrical Issues CAPs, respectively. These CAPs describe in detail the issues, corrective actions and the recurrence control measures for the problems associated with electrical cables. The calculation activity of the DBVP, described in Chapter III, Section 2.3, will address the ampacity of cables. The Environmental Qualification Program described in Chapter III, Section 3.4, addresses the environmental qualification of cables.

- Instrument line inadequacies

NSRS staff stated that the instrument line construction process "is apparently flawed with some very elementary failures that cause the end product to be indeterminate. Basic controls for tube bending were not in place, ferrules put in backwards, incompatible vendor's fittings interchanged, line slopes not maintained, inspection documents forged, and line supports not identified."

Chapter III, Section 2.11 describes the Instrument Lines CAP, which addresses the issues related to instrument line inadequacies.

° Construction processes, in general, are loosely controlled

NSRS staff stated, "In conclusion, the original installations were poorly controlled, often performed by untrained people and inadequately inspected resulting in an indeterminate end product that has deteriorated through time due to disregard for procedures."

The CNPP describes the significant improvements made in TVA nuclear organizations to address past deficiencies. The WBNPP describes the Systematic Evaluation of overall plant design and construction, including corrective actions taken to provide reasonable assurance that WBN will meet licensing requirements and TVA commitments. WBNPP Chapter V, Section 1 also describes the strengthening of the WBN management and organization. Chapter V, Section 2.7.3 describes the design change and modifications control measures.

° Records are of poor quality

NSRS staff stated "from a review of issued reports we have concluded that Quality Assurance records are inadequate and in some instances nonexistent."

Chapter III, Section 2.13 provides a discussion of QA Records CAP which addresses this issue.

° Quality Assurance problem area

NSRS staff stated that the organizational freedom, necessary to allow functioning of corrective action mechanisms, had not been demonstrated to be sufficient to satisfy 10 CFR 50, Appendix B, Criterion I.

The ECSP addressed the issues related to QA, as shown in the attached index. The CNPP describes the significant improvements made in the TVA QA Program. WBNPP Chapter V, Sections 1.2.6 and 2.5 describe the strengthening of the Quality Assurance organization at WBN.

° Q-List is not in good shape and is inconsistent with "CSSC" List

NSRS staff stated, "For some years now, there has been two or three different lists in use by TVA. This has led to much confusion as to which list is the 'Q-List.' As a result there is the distinct possibility that some items that should have been designed, or constructed, or maintained in a 'Q' manner have not been handled as such, and have been, or are still outside the scope of the quality program. One accurate and authoritative 'Q-List' must be established."

Chapter III, Section 2.14 provides a discussion of Q-List CAP, which addresses this issue.

- Material traceability very poor, especially Seismic Category I supports

NSRS staff stated:

"Material has been upgraded to a higher ASME class than when it was purchased and lower class components have been used in higher class systems. This would indicate a fundamental breakdown in the traceability program for this to have occurred.

"A much larger and all-inclusive area of traceability breakdown is in the area of Seismic Category I safety-related supports. Material for these supports has been traced only to warehouse storage. The material was not traced to the point of installation and use as required by 10 CFR 50, Appendix B, Criteria VIII, and ANSI N45.2."

The material traceability issue has been reviewed by the ECSP as shown in the attached index. Also, the Heat Code Traceability CAP, described in Chapter III, Section 2.9, partially addresses this issue.

- Field configuration of cables/supports has lost accumulated loading controls on embedded plates

NSRS staff stated:

"There is a program problem with drawing notes and construction specifications leading to confusion and inconsistent applications in the installation of hangers. There is also no accounting of cumulative loads on embedded strip plates to compare with the original design and acceptance criteria to show that the as-built configuration equals the as-designed configuration.

"In the area of anchor installation, there are problems with installation procedures, inspection procedures and records, responses to requirements in IE Bulletin 79-02, and documentation that would identify faulty installations such as cut anchors. The as-built configuration using anchors is unknown."

The HAAUP CAP, described in Chapter III, Section 2.8, addresses the adequacy of pipe supporting embedment plates. Also, the calculation activity of the DBVP CAP described in Chapter III, Section 2.3 addresses the adequacy of the remaining embedment plates.

The ECSP addressed the issues related to the anchor installation, as shown in the attached index. Additionally, the HAAUP CAP addresses the design adequacy of the anchors as required by IE Bulletin 79-02.

- Nonconformance reporting does not address corrective action aspects appropriately

NSRS staff stated, "Due to management pressures neither IRNs, DCRs, or CARs have been effective in determining root cause and action to prevent recurrences of nonconforming conditions."

The CNPP describes the improvements made in the TVA QA Program. Chapters II and III of this WBNPP describe the Systematic Evaluation of overall plant design and construction and the corrective actions to comprehensively address past problems and prevent their recurrence. The improved corrective action process described in Chapter V, Section 2.4, and the strengthening of the WBN QA organization is described in Chapter V, Section 1.2.6.

° Design control is not initially specified up front nor is final configuration feedback given back to design - margins of safety are indeterminate.

Based on the above ten perceptions, NSRS staff concluded that the design control is not initially specified up front, nor is final configuration feedback given back to design, therefore, margins of safety are indeterminate.

Chapter V, Section 2.7, Design Control, describes the control program implemented at WBN to ensure that appropriate design controls are maintained. Also, Chapter III, Section 2.3 describes the DBVP CAP, which includes the configuration control as one of the activities.

References

1. Tennessee Valley Authority, Memorandum from NSRS Staff Members, R. C. Sauer, J. D. Smith, and P. R. Washer to K. W. Whitt, Director, NSRS. Subject: NSRS Position Paper on Watts Bar Nuclear Plant (WBN) 10 CFR 50, Appendix B Compliance. February 3, 1986.

2. Tennessee Valley Authority, Letter from S. A. White to S. Ebneter (NRC). Subject: Transmittal of EG&G Weld Evaluation Project Reports. February 17, 1988, RIMS No. L44 880217 808.

3. Tennessee Valley Authority, Letter from R. L. Gridley to NRC Document Control Desk. Subject: Transmittal of Welding Project Phase I Report. February 21, 1989, RIMS L44 890221 804.

4. Tennessee Valley Authority, Letter from C. H. Fox, Jr., to NRC Document Control Desk. Subject: Transmittal of Welding Project Phase II Report. April 10, 1989, RIMS No. L44 890410 807.

INDEX OF NSRS PERCEPTIONS TO WBN EMPLOYEE CONCERNS CATEGORY

NSRS Perception	Criteria	Category	Subcategory
Welding Program	- Fitup Inspection	WE	50400
		QA	80200
	- Acceptance Criteria	WE	50400
	- Rod Accountability	WE	50400
	- 45A050 Notes Not Accessible	CO	11100
		EN	22300
		EN	22000
	- Welder Certification Control	WE	50400
		QA	80500
	- Inspection Tool	WE	50400
	- Rod Ovens	WE	50400
	- Training of Weld Inspectors	WE	50400
		QA	80300
		QA	80200
		QA	80100
	- Lack of Independent QC Inspectors	QA	80200
	- Inspection through Carbo-Zinc Coating	WE	50400
		QA	80200
	- Sampling Inspection	QA	80200
		QA	80400
		QA	80300
		WE	50400
		QA	80100

INDEX OF NSRS PERCEPTIONS
TO WBN EMPLOYEE CONCERNS
CATEGORY

NSRS Perception	Criteria	Category	Subcategory
	- Other	QA	80200
		QA	80500
		QA	80300
		WE	50400
Electrical Cable Installation		CO	10900
		OP	30400
		QA	80200
		QA	80400
		QA	80100
		QA	80600
		QA	80500
		CO	15100
		EN	24200
		EN	26600
		CO	19200
Instrument Line Inadequacies	- Tube Bending	CO	17300
	- Compression Fittings	CO	17300
	- FOS Traceability	CO	11100
	- Slope	CO	17300
	- Other	QA	80500
		EN	22800
		CO	17300

INDEX OF NSRS PERCEPTIONS
TO WBN EMPLOYEE CONCERNS
CATEGORY

NSRS Perception	Criteria	Category	Subcategory
Construction Processes	- Inspection		
	° QC Procedures	QA	80200
	° Expansion Anchors	CO	11300
		CO	10900
	° Concrete	CO	10200
		OP	31300
		QA	80100
		EN	25000
		CO	10100
		QA	80600
	° Conduit	CO	19200
		QA	80200
		QA	80500
		OP	30400
	° Support Installation Notes	CO	11100
		CO	10400
		QA	80200
		EN	22000
	° Unistrut Support Bolting	EN	22000
		EN	22800
		EN	22300
		CO	11100
		CO	10200
		CO	11300
		CO	10900
		MC	40400
		QA	80600
		CO	10600
	- Test Control	CO	10200

INDEX OF NSRS PERCEPTIONS
TO WBN EMPLOYEE CONCERNS
CATEGORY

NSRS Perception	Criteria	Category	Subcategory
	- Training/Skills	CO	10000
		QA	80000
	- Other	WE	50400
		OP	30700
		CO	19200
		CO	15100
		CO	10600
Records are of Poor Quality	- Falsified Welder Certification	QA	80500
		QA	80100
		WE	50400
	- Concrete Pour Cards	CO	10200
	- Instrument Line Support Documentation	EN	22300
		QA	80200
	- Safeguards Drawings Accountability	OP	30700
		QA	80500
	- Other References	OP	30100
		QA	80200
		QA	80500
		CO	10200
		EN	24500
		WE	50400
QA/QC Independence		QA	80100
		QA	80400
		OP	30700
		QA	80500

INDEX OF NSRS PERCEPTIONS TO WBN EMPLOYEE CONCERNS CATEGORY

NSRS Perception	Criteria	Category	Subcategory
Q-List	- Conflicting Lists	EN	20900
	- Correctness	EN	20900
	- Two-level quality system	EN	20900
	- Other	EN	22800
		MC	40500
Material Traceability		MC	40300
		MC	40700
		MC	40500
		EN	22800
		WE	50400
		CO	17100
		QA	80100
		MC	40200
Cable/Embedded Plates	- Anchor Installation	CO	10400
		CO	11300
	- Embedded Plate Loading	CO	10400
		EN	25000
		EN	25500
		EN	22100
		CO	11300
	- Specification, etc.	CO	10400
		EN	25000
	- Anchor Inspection Activities	CO	11300
	- Configuration Control	CO	10400
		CO	11300
	- Quality Records	CO	10400
		CO	11300
Nonconformance C/A		WE	50400
		QA	80000
		CO	10000
		OP	30000
		MC	40000

INDEX OF NSRS PERCEPTIONS
TO WBN EMPLOYEE CONCERNS
CATEGORY

NSRS Perception	Criteria	Category	Subcategory
Design Control	- Not Specified Up Front	CO	10000
		EN	20000
		CO	11300
		WP	50400
	- Configuration Feedback	CO	10000
		EN	20000
	- Margins of Safety	EN	20000

NOTE: In cases where the issues may relate to multiple categories, it may be more meaningful to consider the category information first prior to the subcategory evaluations.

D

APPENDIX D

STATUS OF CORPORATE NUCLEAR PERFORMANCE (VOL. 1) COMMITMENTS APPLICABLE TO WBN

References to commitments listed as completed in the original issuance of the Watts Bar Nuclear Performance Plan have not been updated. Commitments that have been completed since the original issuance have been revised as necessary and marked as closed.

Required Completion
O - Ongoing Activity
L - Long Term programs
C - Complete by TVA but not necessarily closed by NRC

APPENDIX D

STATUS OF CORPORATE NUCLEAR PERFORMANCE PLAN
(VOL. 1) COMMITMENTS APPLICABLE TO WATTS BAR

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
III. Hiring and Development of Senior Nuclear Managers				
1	50	TVA will continue the recruitment of experienced managers as well as other experienced professionals from the nuclear industry to serve as permanent TVA employees.	C	A management position exists which has the responsibility to recruit experienced managers for Nuclear Power. From October 1985 to present, Nuclear Power has hired 311 M-5's or above in its effort to bring experienced managers into Nuclear Power.
2	51	NP plans to develop experienced nuclear managers from within its own organization.	C	The following steps have been taken to address the development of managers through systematic development and replacement of managerial talent in NP. 1. Issuance of a manager's instruction by the Senior Vice President of Nuclear Power establishing a program to broaden experience of high performing mid-level managers in preparation for greater responsibility in the organization. Complete September 10, 1987. (Reference Managers Instruction Number 002) 2. A management training program has been implemented which consists of Orientation to Nuclear Supervision (OTNS), Supervisor Development Course (SDC), and Managing for Excellence (MFE), as well as, other management training courses given on "as needed" basis.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
				3. Establishment of a Human Resources Development (HRD) organization within Nuclear Human Resources (NHR) that has designed management development and replacement planning for use by line managers. 4. Ongoing assistance from the HRD staff to assist line managers and NHR managers in implementing management development and succession planning activities. 5. Implementation of a Performance Planning and Evaluation System to assess management skills, provide performance feedback, and establish individual development plans. In that these are ongoing processes, these commitments are considered to be met.
IV. Restructuring of TVA's Organization				
3	62	NP will develop standard procedures to control interfaces with support organizations.	C	This effort is part of the long-term program as identified in commitments 5 and 15. The NP Standard establishing administrative requirements for Interoffice Agreements was approved in March 1987. The development of draft Interoffice Agreements in accordance with the Standard was completed in July 1987. The Interoffice Agreements were approved in February 1989.
4	66	Position descriptions will be written for each of TVA's nuclear vice presidents, duties and responsibilities for which an individual will be held accountable and which performance will be measured. These descriptions will be reviewed and subject to approval by a review team composed of senior TVA and consultant personnel who will report to the Senior Vice President of Nuclear Power.	C	Position descriptions have been written and issued for all management positions.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
5	70	The Senior Vice President is providing guidance to the organization through the issuance of a Policy and Organization Manual that sets forth policy in major areas and defines the organizational structure (in command chart format) together with the organization description for each key functional component of the organization.	C	The Policy and Organization Manual (P&OM) was issued 12/31/86 to reflect the organization in effect at that time. The P&OM will be updated as necessary. This commitment is complete.
E. Improvements in Specific Functional Areas				
1. Quality Assurance				
6	72	The long-term program will result in a standardized Nuclear Quality Assurance Program for TVA.	C	The interim NQAM was approved and issued in November 1986. The Topical Report Rev. 9 was released for NRC approval November 14, 1986 and subsequently approved by the NRC on January 30, 1987. The NQAM contains a corporate QA requirements volume defining generic requirements and procedures applicable to design, construction, and operations. As the Nuclear Procedures System is developed, QA requirements contained in the NQAM are being transferred to corporate-level Directives and Standards through a controlled transition process. The Topical Report Revision 10 was submitted to NRC on May 4, 1988 in accordance with 10 CFR 50.54(a) (3). TVA has developed a Nuclear Quality Assurance Program Plan which will be implemented upon review and approval by NRC. (Approval will be assumed by TVA 60 days after submittal to the Commission if no letter is received from the appropriate reviewing office.) This plan was submitted to NRC on March 30, 1989 and will replace the existing TVA Topical Report Revision 10, once approved and implemented. In addition, the NQAM will be transitioned into Directives, Standards, and site-level procedures through the Nuclear Procedures System.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
			C WBN	WBN-specific information concerning this is discussed in Chapter V, Section 1.2.6, Completion Assurance and Section 2.5, Quality Assurance.
7	75	Where required, additional QA or QC procedures will be written to cover new functions.	C	All QA and QC procedures identified to cover new functions have been written.
8	75	NQA internal QA and QC procedures will be consolidated into a single set of procedures. Functions that will be performed uniformly throughout NQA will be identified and the multiple procedures that now exist will be replaced by a single procedure applicable to all organizations.	C	The NQA internal procedures have been consolidated into a single set, and have been approved, issued and implemented. Functions that will be performed uniformly throughout NQA have been identified, and the multiple procedures that now exist are being replaced by a single procedure applicable to all organizations. All procedures have been approved.
9	75	As new procedures are developed throughout NP, NQA will review and concur in those that implement quality assurance requirements.	C	NP Directive 4.4 Rev 0 was approved on 11/5/86. It establishes the responsibility for NQA to review and concur with new NP procedures. QA Topical Report TVA-TR75-1A, Rev. 9 lists all manuals covering quality related activities during design, construction, and operation. This commitment is complete.

V. Restoring Employee Confidence in TVA Nuclear Management

1. Special Program at Watts Bar for Resolving Employee Concerns

10	96	After each review group identifies a generic condition, the review group will perform a root cause analysis of each such condition and will require TVA line management to evaluate the condition and recommend action to remedy the root cause of the condition.	C	This item is complete. All reports have been submitted to NRC (2/6/89). Root cause analysis of identified conditions are contained in those reports and recommended actions are either complete or in progress to correct these conditions.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
11	97	TVA plans to make the results of the Watts Bar Employee Concern Special Program (WBECSP) available to all present TVA nuclear employees. The summary report will be available as requested to interested parties as well as to former TVA nuclear employees who left the nuclear program between March 31, 1985, and the date that the summary report is issued.	C	WBN-specific information concerning this is discussed in Chapter II, Section 2.4.2, ECSP Results.
12	97	The Office of General Counsel or the Inspector General will investigate and report separately on cases involving wrongdoing, misconduct, intimidation, or harassment.	C	TVA Code of Conduct XIII and TVA Instruction, PM-7, defines the investigative role of the OIG. OGC has no investigative role in IH and wrongdoing. This commitment is complete.
13A, B	101	TVA will review the WBECSP concerns and the NPECP to identify any trends and the collective significance of the concerns, to identify the root causes of any adverse trends, and to develop appropriate corrective action.	C	The ECTG has reviewed and identified all concerns for generic applicability to SQN. These trends have been evaluated for SQN restart and will be included within the ECTG and Category Reports. For the "new" Employee Concern Program (ECP), total data volume reached a point in August 1986, whereby meaningful trends were analyzed. These trends were reported on a monthly basis beginning in August 1986 to TVA higher level management and ECP site representatives. The enhanced computerized data base was made available to all ECP personnel on January 22, 1987. The data base is used for tracking and trending of employee concern information. The ECSP program summary report was sent to NRC on February 6, 1989.
13C	101	The Site Representative will periodically determine employee understanding of and satisfaction with the ECP.	C	This activity is proceduralized. Various means have been utilized to determine employee understanding of and satisfaction with the program. Selected interviews and mini surveys have been conducted. A formal survey was released in November 1986. Audit reports concerning the program have demonstrated employee understanding. Employee Concern Program Instruction 1, Section 5.5, requires the subject activity.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
VI. Improvements in TVA's Nuclear Management Systems and Programs				
C. Improving Management Systems and Controls				
1. Improvements in Programs and Procedures				
14	117	In the short term, TVA will prepare standards for developing directives and procedures for each of the headquarters departments and sites and will assure that those corporate-level nuclear procedures required to control corporate-level activities which support the safe operation of each nuclear plant are in place. Also in the short-term, the existing nuclear procedures at each site will be revised to correct documented deficiencies, reflect the new organization and reflect installed plant modifications.	C SQN	(1) An interim directive defining the interim procedure system for SQN was approved and issued September 5, 1986. Additionally the administrative Standards for developing Directives, Standards, Procedures, and Instructions for each of the headquarters departments and sites have been approved. (2) A list of corporate-level procedures that are required for SQN startup has been compiled and is maintained by the Nuclear Procedures Staff. The list identifies corporate-level procedures requiring revision before SQN unit 2 startup. (3) SQN site procedures required for the restart of SQN units 1 and 2 have been revised. Preparation and revision to corporate-level procedures required for BFN unit 2 restart will be completed by June 1989.
			C WBN	WBN-specific information concerning this is discussed in Chapter V, Section 2.3, Procedures.
15	118	In the long term, TVA is developing an integrated Nuclear Procedures System to aid the administration of the NP activities. The restructured NP procedure hierarchy will consist of five levels of documentation designated as Policies, Directives, Standards, Procedures and Instructions.	C	(1) Status of policies is reported under commitment item 5. (2) The Policy and Directive governing the new Nuclear Procedures System have been approved and issued. The administrative Standards for Directives, Standards, Procedures, and Instructions have also been approved and issued. Other program Directives and Standards are being developed.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
		2. Improvements in Planning and Integration of Nuclear Activities		
16	121	Nuclear Business Operations provides the overall direction to nuclear sites and headquarters departments in the execution of business planning, scheduling, accounting, and budgeting activities of TVA's nuclear activities.	C	The Long Range Planning and Nuclear Budget and Cost Control organizations were formed under Nuclear Business Operations to provide overall direction for NP in business planning, and budgeting activities. Under the present nuclear organization; the Nuclear Finance and Planning organization under Nuclear Business Operations will continue to provide overall direction for Nuclear Power in business planning, accounting, and budgeting activities; and the new Special Projects organization under Nuclear Technical Direction will provide overall direction to nuclear sites and headquarters departments in the execution of planning, scheduling, and cost estimating activities for Nuclear Power projects. The newly formed Special Projects organization is responsible for the development of the Integrated Living Schedule (ILS).
17	123	The Division of Nuclear Services* will establish a system of data bases that can be utilized by the responsible NP department using the concept of sharing computer-stored data among cooperating organizations.	C	General The Information Management Program is being restructured within NA&S to improve control of corporate information systems, based on experience during the past year. Personnel Candidates for top level managerial positions in this organization have been interviewed. The Information Systems Manager of Management Systems has been hired. ADP Centralized control of acquisition of software and equipment has been established, and the responsibility for software change control has been identified and instituted.

*Function is now under the Vice President, Nuclear Assurance and Services

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
				NQAM Part I, Section 2.2.1, Rev. 1, QA for Computer Software Systems has been implemented. Responsibility for defining the integration plan has been assigned to the Planning Staff. Initial high-level studies are complete and a project proposal is underway to scope the needed data bases and identify their interfaces. By the end of March 1987 a plan was to be in place to identify the consensus strategy for this long-term project. The plan was completed on time; however, execution of the plan has been deferred, pending restructuring of the Information Management Program. The first implementation milestone is the creation of a list of TVA computer applications currently used to supply NP's information needs. The initial list was created on schedule. The information systems workplan No. 1 has been issued, showing NP priorities and objectives. Responsibility for defining the requirements for an integrated CM system has been assigned to the CM Branch. The implementation of the master component part of the CM system has begun and the definition of the requirements for the Controlled Document System has been started.
D. Improving TVA's Nuclear Corrective Action Program				
1. Assuring Timely Corrective Action				
18	132	The Tracking and Reporting of Open Items (TROI) computer system is being implemented as the single corporate system for tracking CAQs as specified by the NQA program and procedures.	C	Implementation is complete. (Administrative CAQ programs are tracked and trended by approved Procedures.)

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
19	132	The analysis of trend data will be the responsibility of line managers. NQA identifies QA trend indicators and perform a corporate-wide QA trend analysis on an ongoing basis.	C	Implementation is complete. QA is preparing monthly reports. The trend analysis program now includes all CAQRs. Adverse trends based on these CAQs will be evaluated to determine their root cause, and recommendations made to remedy the problem. This commitment is complete.
	2.	Identification of the Root Cause of Problems		
20	132-133	Each significant CAQ will be individually analyzed to determine its root cause and to recommend action to remedy that cause. CAQs will be categorized, such as, responsible group for cause, type of condition, type of matter or item which is deficient and if the CAQ is significant the root cause of the condition. Adverse trends will be evaluated to determine their root cause and to recommend action to remedy that cause, to enable management to perform its own assessment and ensure that appropriate remedial action is implemented.	C	A new CAQR procedure has been approved and issued and implementation throughout NP is complete. NQAM, Part I, Section 2.16, Rev. 4, Corrective Action, was issued 5/18/88. The program is in place and CAQs have been entered for trending. This commitment is complete.
	3.	Identification of Problems Applicable to More than One Plant		
21	134	Licensing personnel, under the direction of the Manager of Nuclear Licensing and Regulatory Affairs will be responsible for managing the TVA Nuclear Operating Experience Review program system for internally and externally identified problems or events. This system will be used to develop experience review reports, screen information for applicability to TVA, and develop corrective recommendations or positions to be provided to sites, engineering and training personnel to take immediate corrective action if necessary.	C	Existing NER program being managed by NLRA is being upgraded and restaffed. Information meetings have been held with NRC to include their methods and screening criteria into our program where feasible. Corporate and site schedules are being revised to strengthen the program by defining responsibilities and interfaces and developing a feedback mechanism for recommendations. Procedures for NER were issued in January 1987. The TVA NER Program has developed the interim procedure PMP 0601.01, Nuclear Experience Review. Division procedure DNSL-DVP-6.1-2, Rev. 0, has been written and approved (1/13/87).

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
				Job descriptions and personnel interviews have been completed. PMP 0601.01 and DNSL-DVP-6.1-2, Rev. 0 were implemented March 30, 1987. As of July 20, 1987, all personnel were in place except for the secretarial position, which was being filled on a temporary basis. This job was filled on 10/13/87. This commitment is complete.
			C WBN	WBN-specific information concerning this is discussed in Chapter V, Section 1.2.2, Site Licensing Manager.
22	134	A corporate nuclear operating experience data base to interface with all facets of the TVA nuclear organization will provide the management tool to track all experience review items and to establish a feedback mechanism to ensure recommendations are factored into respective programs of operations, design, construction, and training.	C	The NER data base is established to track all NER items and provide a feedback mechanism to ensure recommendations are factored into the respective program for operation, design, construction, and training.
			C WBN	WBN-specific information concerning this is discussed in Chapter V, Section 1.2.2, Site Licensing Manager.
E. Programmatic Improvements				
1. Improvements in Operations				
23	136	TVA's nuclear management will monitor for procedural noncompliance when conducting plant performance assessments. Procedures will specify progressive disciplinary action for failure to follow procedures.	C	QA policy issued. This commitment is complete. WBN-specific information concerning this is discussed in Chapter V, Section 1.2.3.1, Operations.
24	137	TVA has made plant-specific improvements in operator training.	C	Plant-specific improvements for startup have been incorporated and the item is complete for SQN. PMP 0202.05 defines the nuclear plant operator training program. Functional training simulators to aid in operator development are now at BFN, SQN and WBN. An operator evaluation and assessment group has been organized.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
				WBN-specific information concerning this is discussed in Chapter V, Section 1.2.7, Site Training Manager and Section 2.2.2, Operations Training.
25	138	The NP headquarters organizations will have personnel with expertise in operations, maintenance, chemistry, health physics, planning, scheduling, and other disciplines relevant to the overall operation and maintenance of nuclear plants. These personnel will assist management with the development of TVA policy, goals and objectives for operation and maintenance activities, will monitor implementation of policy through onsite assessments of plant programs and observation of work activities, and assess site performance through review of performance data.	C	The Nuclear Power headquarters organizations are in place, functioning responsibilities have been defined, and staffed to authorized headcount levels continues. In that these core organizations are staffed to a functioning level this commitment has been met. NP-DIR.5.8 defines the functions of the manager of Chemistry and Environmental. NP DIR.10.2 defines the responsibilities of Manager of Radiological Control.
26	138	An expanded corporate nuclear performance reporting system is being developed to collect key performance indicators for trending and analysis.	C	The corporate-level performance report has been revised to include the INPO-suggested performance parameters and to include not only generation data but also data on compliance, health physics, safety, and cost. The performance reporting staff at SQN and BFN has been reorganized to allow it more convenient and ready access to pertinent performance data. This commitment has been completed. TVA has compared earlier versions with more recent Nuclear Performance Reports. Later versions show improvements and provide clearer more concise text with greater detail. Generation data has been enhanced in accordance with INPO Good Practice OA-102 guidelines. Sections were added to cover Compliance, Health Physics, Nuclear Safety, and Costs. TVA concludes that improvements meet the intent of the commitment.

Commitment Item	Vol. 1 Rev. 6 Page		Required Completion	Summary of Progress
27	138	TVA will implement a system engineer program at each nuclear site.	C	As indicated in TVA's letter of April 5, 1991, actions necessary to satisfy this commitment have been completed. BFN implementation is described in Volume 3. WBN-specific information concerning this is discussed in Volume 4, Chapter V, Section 1.2.3.2, Technical Support Manager.
28	140	The NMRG was charged with the responsibility of conducting a comprehensive review of corrective and preventive maintenance at Sequoyah, Browns Ferry, and Watts Bar Nuclear Plants.	C SQN	The Nuclear Manager's Review Group (NMRG) completed work on a comprehensive review of maintenance at SQN, WBN, and BFN. The report of review results was submitted to NRC on Sept. 30, 1986. Report was resubmitted 12/27/86 with action items assigned. Findings from the report were evaluated and a comprehensive corrective action plan was submitted to S. A. White on April 28, 1987. All findings and corrective actions are being tracked on TROI. In an NRC exit meeting on July 31, 1987, all maintenance-specific findings with identified restart actions were closed for restart with the balance of corrective actions having long-term solutions. This commitment is complete for SQN. BFN implementation is described in Volume 3. WBN-specific information concerning this is discussed in Volume 4, Chapter V, Section 1.2.3.3, Maintenance.
2. Improvements in Maintenance				
29	141 142	Improvements are being made in the nuclear site preventive maintenance. These improvements emphasize reducing recurring corrective maintenance requirements, improving use of predictive maintenance, and adherence to established preventive maintenance routines. Analysis of	C	As indicated in TVA's letter of April 5, 1991, actions necessary to satisfy this commitment have been completed. BFN implementation is described in Volume 3. WBN-specific information concerning this is discussed in Volume 4, Chapter V, Section 1.2.3.3, Maintenance.

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		equipment performance history and maintenance history, including reliability and availability information from NPRDS and TVA sources, will be used, together with vendor recommendations, to develop optimum preventive maintenance routines.		
30	142	The planning and scheduling process for maintenance activities is being upgraded so that the full scope of significant maintenance activities will be defined in advance of performing the activity, will be coordinated with the appropriate organizations, including operations and quality assurance, and will be completed prior to closeout of the activity. Onsite planning and scheduling activities will continue to improve as additional improvements are made to the computerized data handling systems.	C SQN	The plant maintenance planning organization has been established and has daily coordination meetings with appropriate interface organizations to plan, schedule, and coordinate maintenance activities for the following day. The maintenance planning organization interfaces with Planning and Scheduling organizations to establish a priority for work, integrate the maintenance activities, and coordinate scheduling and tracking to completion. This commitment is complete for SQN.
			C WBN	As indicated in TVA's letter of April 5, 1991, actions necessary to satisfy this commitment have been completed.
31	142	Training of nuclear maintenance personnel is being upgraded at all sites. Accreditation of instrument technician, electrical, and mechanical maintenance training is being pursued. This long-term program will result in a system where maintenance activities that require specialized skills will	C	The SQN, BFN, and WBN maintenance training programs have been accredited by INPO.
			C WBN	WBN-specific information concerning this is discussed in Chapter V, Section 2.2.1, Accreditation Status, and Section 2.2.3, Maintenance Training.

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		be identified and only those personnel evaluated as possessing the required skills will be assigned responsibility for performing the work.		
		3. Improvements in Welding		
32	145	The Welding Project will determine the adequacy of the nuclear welding program to control welding and identify any deficiencies in the program and propose corrective actions or improvements.	C SQN	The Phase II Welding Project report for Sequoyah has been submitted to and reviewed by NRC. NRC's FSAR for SQN is complete. Response to SER, which completed this item, was submitted to NRC on January 30, 1987. This is complete for SQN. Inspection Report 50-327 and 50-328/87-21 documents closure of open welding issues for SQN including programmatic improvements WBN-specific information concerning this is discussed in Chapter III, Section 2.18, Welding.
33	145	TVA is initiating appropriate changes to programs as the changes are identified by the welding projects at each site.	C SQN	No further actions necessary for SQN restart. WBN-specific information concerning this is discussed in Chapter III, Section 2.18, Welding.
34	70	Future updates to organization descriptions will be made through submittal of, and change to, an organization description topical report.	C	Organization description topical report has been prepared.
		The Configuration Management function will include a controlled master equipment list and a master design document list.	L	Planning is complete and compilation of input data has started. MEL is in process, with Fall 1991 completion expected.
36	123	Implementation of the ILS program will be an ongoing effort applied to each nuclear plant as it reaches operational status.	C	As indicated by TVA's letter of April 5, 1991, actions necessary to satisfy this commitment have been completed.

E

APPENDIX E

STATUS OF WATTS BAR NUCLEAR PERFORMANCE PLAN
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Status
O - Ongoing Activity
F - Fuel Load for WBN
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I. INTRODUCTION				
	1.0	Purpose		
1	I-1	It will be necessary to conduct an evaluation of results and conclusions drawn from the programs described in this volume at a later time to determine their applicability to unit 2.	L	
	3.0	Outline of TVA's Approach to Correcting WBN's Problems		
2	I-5	As a final confirmation of the adequacy and implementation of the design, construction, and inspection processes and the adequacy and implementation of corrective action programs, the Site Quality Manager will perform an in-depth technical audit at WBN. The audit will be managed by an organization separate from the WBN line organization and will be performed by a team composed of experienced technical personnel. The audit will be similar to the NRC Integrated Design Inspection (IDI) performed at the Sequoyah Nuclear Plant (SQN), but expanded to include additional construction, installation, inspection, operations, and maintenance areas. The audit will be conducted approximately six months before fuel load and at or near completion of CAPs and Special Programs. The audit scope will include a safety	F	

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I. INTRODUCTION (Continued)				
3.0 Outline of TVA's Approach to Correcting WBN's Problems (Continued)				
		system, support systems, and portions of other systems and structures as necessary to obtain adequate coverage. An audit plan will be prepared well in advance of the audit to define, in detail, the audit scope, its approach and the criteria for selection of systems and structures. The audit plan and report will be provided to the NRC.		
II. WATTS BAR ASSESSMENT				
4.0 Watts Bar Program Team				
3	II-12	The WBPT will remain onsite following the issuance of this WBNPP to provide advice and assistance to assure that the WBNPP is being effectively implemented. In fulfilling this role, the WBPT will review and approve changes to CAPs and Special Programs and will provide any necessary recommendations for changes to this WBNPP to the Senior Vice President of Nuclear Power. As the corrective action plans are implemented using the methods outlined in this WBNPP, the need for continued WBPT involvement will be evaluated by the Senior Vice President of Nuclear Power.	C	The WBPT was discontinued effective May 1, 1991. Notification was provided to NRC on August 5, 1991 (Ref. 116).

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II. WATTS BAR ASSESSMENT (Continued)				
5.0	Systematic Evaluation			
4	II-18	Fewer than twenty of the more than 3,300 attributes require additional reviews. Upon further consideration of the ACR that addressed the diesel generator, approximately 50 attributes were added. These reviews will be performed to provide an additional demonstration of adequacy of these attributes. Appropriate corrective actions will be developed for nonconforming issues identified.	F	
III. CORRECTIVE ACTIONS				
1.0	Introduction			
5	III-5	Corrective actions will be taken in parallel with CAP implementation to correct identified damaged, loose, missing hardware deficiencies.	F	
6	III-5	Also, walkdowns of systems, identified in the Prestart Test Program CAP will be performed before fuel load to identify and correct additional damaged, loose, or missing hardware.	F	

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III. CORRECTIVE ACTIONS (Continued)				
3.0	Special Programs			
7	III-19	The long-term temperature profile for lower containment will be determined for the duration of the design basis MSLB event using the Ice Condenser and Containment Spray Systems as the safety-grade systems for removing containment ambient heat post-MSLB.	C	Commitment tracking item no. NCO 870368008 indicates completion of this activity on October 11, 1989.
8	III-19	The Lower Compartment Cooler (LCC) units and associated ducting will be upgraded to safety grade, with the exception of the LCC coils. This upgrade will provide a fully qualified means of providing air circulation via the LCC fans and ductwork to subcompartments of lower containment to prevent hot spots from forming in these compartments.	F	
9	III-19	A containment coatings transport evaluation will be performed to confirm that the protective coatings inside containment will not affect sump screen performance.	F	
10	III-19	The components in lower containment important to safety will be qualified to the revised calculated MSLB temperature profile.	C	Commitment tracking item no. NCO 870368010 indicates completion of this activity on March 1, 1991.

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III. CORRECTIVE ACTIONS (Continued)				
3.0 Special Programs (Continued)				
11	III-22	NE will develop and issue an MFL for the indicated categories of Class 1E fuses. This list will be maintained as a design output document.	F	
12	III-23	NE will issue design output to replace the existing Bussman KAZ actuator devices.	C	Commitment tracking item no. NCO 890112027 indicates completion of this activity on September 11, 1989.
13	III-23	NE will evaluate the EPA protection fuses and perform calculations or rework as necessary to ensure adequacy of the installation.	F	NE has completed the evaluation of the EPA protection fuses and has performed calculations on all penetration protection fuses. Failures have been identified and resulting rework, if any, will be performed in conjunction with the resolution of cable and raceway issues. The closure report has not been completed.
14	III-23	These corrective actions are being implemented in accordance with existing design change processes and procedures. All corrective actions will be completed before fuel load.	F	
15	III-23	The MEQ Program Analysis will be done on critical components prior to fuel load.	F	

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III. CORRECTIVE ACTIONS (Continued)				
3.0 Special Programs (Continued)				
16	III-25	Systems potentially affected by MIC have been identified and water samples have been tested to determine the presence of the bacteria associated with MIC. Visual examinations have been performed when raw water systems have been opened to determine the extent of the infestation, and procedures and instructions are in place to monitor the progression of the degradation resulting from MIC. These same instructions and procedures will provide feedback on the effectiveness of TVA's efforts to control MIC and other corrosion mechanisms in the stainless and carbon steel raw water systems.	O	TVA has installed a chemical treatment skid at the intake pumping station, which destroys the MIC bacteria's ability to adhere to the pipe wall. MIC Special Program was submitted to the NRC by TVA letter on February 26, 1991 (Ref. 110).
17	III-25	After completion of this discovery phase, specifications, DCNs, and procedures will be revised or developed as necessary to implement recurrence control measures. Implementation of this program will control or minimize the effects of MIC activity in raw water piping and components at WBN.	O	TVA has installed a chemical treatment skid at the intake pumping station, which destroys the MIC bacteria's ability to adhere to the pipe wall. MIC Special Program was submitted to the NRC by TVA letter on February 26, 1991 (Ref. 110).

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III. CORRECTIVE ACTIONS (Continued)				
3.0	Special Programs (Continued)			
18	III-26	As corrective action, including implementation of necessary plant-upgrades, TVA will perform a documented evaluation of the effects of flooding due to moderate energy pipe failures outside containment in Category I structures. This will verify that all essential elements and structures are either unaffected by any postulated flooding, or are designed, specified, and/or qualified for the environment caused by such flooding.	F	
19	III-27	Corrective actions for the outstanding CAQRs include: Evaluation of current RMS design, documentation, and installations against the updated design criteria to verify acceptability of the current installations or to identify required modifications.	C	Commitment tracking item no. NCO 890112038 indicates completion of this activity on March 23, 1990.
20	III-27	Corrective actions for the outstanding CAQRs include: Modification or reworking of existing installations and correcting documentations as necessary to correct deficiencies.	O	

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IV. IMPLEMENTATION, VERIFICATION, AND CLOSURE				
2.0 Corrective Action Program Plans and Special Programs				
21	IV-1	Proposed changes to the corrective actions of the CAP, Special Program, or the other corrective action documents, employee concerns, NRC findings, and VSR discrepancies that form their basis will be controlled by site instructions. These site instructions define responsibility and authority for change approval and include requirements for appropriate licensing commitment revisions.	C	Commitment tracking item no. NCO 890112048 indicates completion of this activity on June 20, 1989.
22	IV-2	Site QA will provide independent verification of CAP and Special Program activities. This will be done as part of the integrated verification plan.	O	
23	IV-2	A final report will be issued providing the basis for closure of each CAP or Special Program. The report will include conclusions regarding the extent of program implementation, the closure of items that were the basis of the program, program revisions, and the accomplishment of program objectives.	F	

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IV. IMPLEMENTATION, VERIFICATION, AND CLOSURE (Continued)				
3.0 Vertical Slice Review				
24	IV-2	Therefore, corrective action documents referenced by RRs will be initiated or revised to identify the DRs they will resolve.	C	Commitment tracking item no. NCO 890112053 indicates completion of this activity on June 7, 1989.
25	IV-2	Incomplete corrective actions will be coded so as to be readily identifiable as commitments related to the VSR. These incomplete corrective actions will then be tracked to completion.	C	Commitment tracking item no. NCO 890112054 indicates completion of this activity on November 27, 1989.
26	IV-3	The organization responsible for resolving the DR with the VSRT will review the completed corrective actions and the original commitments in the RR and CR to determine whether or not they have been fulfilled.	C	Commitment tracking item no. NCO 890112055 indicates completion of this activity on November 29, 1989.
27	IV-3	The VSR Final Report made several recommendations for which implementation plans will be prepared by the line organization for review for acceptance by the WBPT.	C	The WBPT records show that the implementation plans for the VSR recommendations have been reviewed and accepted. The TROI closure package is in preparation.
28	IV-3	A final closure report for the full scope of the VSR will be prepared by the Manager of Projects at the completion of all DR closure reports. The report will include conclusions regarding the	F	

APPENDIX E

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Commitment Item	Vol. 4 Page		Required Completion	Progress Statement
IV. IMPLEMENTATION, VERIFICATION, AND CLOSURE (Continued)				
3.0 Vertical Slice Review (Continued)				
		extent of corrective action implementation. Verification of the implementation of the VSR recommendations will also be discussed in this report.		
5.0 Quality Verification Process				
29	IV-4	To perform these verification actions in a planned and systematic manner, the Site Quality Manager will implement the IVP. The IVP will coordinate the independent quality verification activities being performed at WBN by the different quality organizations. Through a dynamic, closed-loop process using feedback to vary the verification intensity and approach, the IVP will provide reasonable assurance that the appropriate levels of quality have been achieved for the required activities.	C	Commitment tracking item no. NCO 890112058 indicates completion of this activity on January 31, 1990.

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Commitment Item	Vol. 4 Page		Required Completion	Progress Statement
V. WATTS BAR MANAGEMENT AND ORGANIZATION				
1.0 Strengthening WBN Management and Organization				
30	V-1	In the very near future the Site Director will report to the Vice President, New Projects. The Vice President, New Projects will have overall project-management responsibility for construction, engineering, startup testing, and plant operations required to support the completion and startup of the new projects, which include WBN. The Vice President, New Projects will be responsible for supporting the technical activities required to license the new projects.	C	The Site Vice President has replaced the Site Director, and reports to the Vice President, Nuclear Projects. TVA Topical Report TVA-NPOD89-A was submitted to NRC by letter dated April 18, 1991 (Ref. 3).
31	V-3	To enhance overall plant safety, an independent safety engineering group will be established and staffed independent of site management before fuel load. This group will perform independent safety reviews of plant activities including maintenance, modifications, operational problems, and operational analyses. TVA plans to merge the work of this group with that of the Nuclear Managers Review Group (NMRG) before fuel load.	C	The TVA Topical Report TVA-NPOD89-A (Ref. 3), approved by the NRC by letter dated June 26, 1991 (Ref. 4), captures the requirements for the Independent Safety Engineering function being implemented at all sites, including WBN.
32	V-10	The Nuclear Experience Review Program (NERP) has been established as part of the TVA corporate program managed by Nuclear Licensing and	C	Commitment tracking item no. NCO 890112066 indicates completion of this activity on August 18, 1989.

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Commitment Item	Vol. 4 Page		Required Completion	Progress Statement
V.	WATTS BAR MANAGEMENT AND ORGANIZATION (Continued)			
	1.0	Strengthening WBN Management and Organization (continued)		
		Regulatory Affairs. Enhancements in this program will include the use of TVA and other utility experience when developing corrective or preventive action plans to address problems or issues at each of TVA's plants.		
33	V-13	An upgrade of plant SIs to incorporate human factors improvements and field verification will be completed before fuel load.	F	
	2.0	Management Control and Involvement		
34	V-27	The Accreditation Self Evaluation Reports (ASER) for the remaining programs (three operator training programs, STA training, and TS&M training program) will be submitted to seek accreditation before fuel load of WBN unit 1.	C	Commitment tracking item no. NCO 890112070 indicates completion of this activity on May 29, 1990.
35	V-30	Procedures needed to support WBN unit 1 fuel load and safe operation will be upgraded or developed to accomplish the following:	F	

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Commitment Item	Vol. 4 Page		Required Completion	Progress Statement
V. WATTS BAR MANAGEMENT AND ORGANIZATION (Continued)				
2.0 Management Control and Involvement (Continued)				
35a		Correct documented deficiencies or weaknesses. These deficiencies or weaknesses have been identified and documented by NRC, industry organizations (e.g., INPO), and internal TVA audits or inspections.	F/O	
35b		Account for completed plant modifications and the results of system walkdowns.	F	
35c		Reflect changes in responsibilities and authorities resulting from major plant reorganizations.	O	
36	V-31	WBN will upgrade and enhance (including a full technical review) technical specification Surveillance Instructions (SIs), Instrument Maintenance Instructions (IMIs), and Operations Procedures.	F	
37	V-36	As WBN unit 1 approaches fuel loading, TVA will enhance the DCN process to include additional requirements (e.g., Unreviewed Safety Question Determination) needed for an operating plant.	F	

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Commitment Item	Vol. 4 Page		Required Completion	Progress Statement
VI. OPERATIONAL READINESS				
5.0		Implementation		
38	VI-3	The self-assessment will evaluate key performance objectives, which are necessary to ensure that WBN site organizations function effectively and are prepared for plant fuel load, startup, and power operation.	F	
6.0		Reporting		
39	VI-5	Prepare a startup prerequisite checklist that consolidates hardware operability issues which must be completed before either fuel load or startup. Document completion of the startup prerequisite checklist.	F	
7.0		Fuel Load Certification		
40	VI-6	A fuel load certification letter will be provided to NRC when TVA determines that the design, construction, testing, and preparation for operation of WBN unit 1 are substantially completed in accordance with the FSAR and other appropriate licensing documents. This letter will document TVA corporate management's approval to proceed with loading fuel.	F	

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		STATUS OF WATTS BAR NUCLEAR PERFORMANCE PLAN (VOLUME 4), REVISION 1 COMMITMENTS		
III. CORRECTIVE ACTIONS				
3.0 Special Programs				
41	III-25	The chemical treatment system to be added as part of the MIC program will also add a nonoxidizing biocide for the control of mollusks and for long-term control of bacteria in piping where flow is low or generally stagnant.	0	
IV. IMPLEMENTATION, VERIFICATION, AND CLOSURE OF CORRECTIVE ACTIONS				
5.0 Quality Verification Process				
42	IV-5	As part of the enhancement to the IVP, the specific verification plan developed for each CAP and Special Program will include, where appropriate, an interim assessment at approximately the 75-percent level of completion.	0	

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V.	WATTS BAR MANAGEMENT AND ORGANIZATION			
1.0	Strengthening WBN Management and Organization			
43	V-4	Due to the extent of plant modifications since original conduct of systems preoperational testing, the Startup and Test Organization will implement an additional test program. The Startup and Test Manager will address the requirements of the Prestart CAP and will include testing for some systems outside the scope of the CAP.	F	
44	V-20	Areas of concern or specific recommendations identified during the course of the PAC/AQ reviews will be documented and tracked to closure.	F	
2.0	Management Control and Involvement			
45	V-27	The Licensed Operator Requalification Training Program was initially accredited as part of the RO and SRO programs in December 1990. This program's accreditation will be reviewed independently during the 1994 renewal exercise.	L	