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 and SCR WBNNEB8677 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 phenomena 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.

Systems potentially affected by MIC will be identified by testing water samples, performing visual inspections, reviewing design and operating documents, and reviewing preexisting NDE results. If necessary, NDE methods, along with the appropriate acceptance criteria, will be developed in accordance with applicable code requirements to assess MIC infested locations identified during the visual inspection phase of the program. The results of this subsequent evaluation will be used as a reference to establish criteria for future inspections and testing. Unacceptable damage will be repaired in accordance with existing code requirements.

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.

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 1 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 analysis, 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.

3.9 Radiation Monitoring System

The Radiation Monitoring System (RMS) program was developed to ensure a programmatic corrective action for numerous individual CAQs 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 CAQs 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. 49).

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 CAQs 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.

- Modification or reworking of existing installations and correcting documentations as necessary to correct deficiencies.

Recurrence control includes providing an 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 are being implemented:

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

- Revise Watts Bar FSAR Section 2.5 to incorporate the underground barrier "as-built" information.

3.11 Use-As-Is CAOs

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. 50).

TVA's corrective action plan includes the following actions:

- Identify 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, identify those that had no design drawings or document issued as a result of the final disposition being "Use-as-is" or "Repair."

- Identify 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, perform a technical review of the latest revision of the document and consider what effect the condition described by the CAQ has on the document. Either prepare or revise a calculation, if required, to technically justify the current revision of the document and indicate what cumulative effect, if any, that the CAQ or CAQs have on the document as to technical adequacy, design margin, conformance to criteria, and FSAR commitments. Process the document by existing design change control requirements to reflect the as-constructed configuration represented by the CAQ.

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

- File the matrix drawing with each CAQ listed on that matrix.

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 replaced by AI 2.8.14. A specific requirement is included to ensure that appropriate design documents reflect the approved configuration for any "Repair" or "Accept-as-is" dispositions. AI2.8.14 also requires the basis for approval of "Repair" or "Accept-as-is" dispositions to be documented along with the disposition on the CAQ report. At the division level, 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. 51) was submitted to the NRC by letter dated September 14, 1988. The corrective actions are being implemented in accordance with existing design change processes and procedures. The corrective actions 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. 9). 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:

Containment Isolation

A CAP on containment isolation was submitted to NRC on October 20, 1988 (Ref. 29) 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. 52 and 53) and consideration of the NRC staff positions expressed in teleconferences on February 14, February 17, and April 10, 1989 (Refs. 54, 55, and 56), 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. 57).

Specification Improvement Program (SIP)

At the time the listing of Special Programs was developed, a Specification Improvement Program was contemplated. However, as

further work on each of the identified issues was completed, it was judged that the need for revised specifications would be evaluated with each issue. Therefore, SIP was not included in the Special Program Section 3 of this chapter.

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.

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 Director Procedures for corrective action that implements the TVA Nuclear Power unified program of corrective action for ensuring that CAQs 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 CAQ 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 CAQ process is discussed in detail in Section 2.5 of Chapter V.

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, Sections 5 and 6, and employee concerns discussed in Chapter II, Section 2.2.

Other corrective actions of lesser breadth or significance will continue to be administered under the TVA CAQ program as discussed in Chapter V, Section 2.5.

2.0 CORRECTIVE ACTION PROGRAM PLANS AND SPECIAL PROGRAMS

2.1 Implementation

A Project Manager will be 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 the Manager of Projects or a cognizant senior line manager, who reports to the Site Director. 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 (see Chapter V, Section 1.2.6). 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 CAQs 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 CAQs, 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 verification plan discussed below 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 CAQ program. Therefore, CAQs referenced by RRs will be initiated or revised to identify the DRs they will resolve. This will ensure that corrective actions for VSR discrepancies are administered in the TVA CAQ 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 CAQ 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 CAQ program tracking. 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.

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 will review 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 the WBPT and must be approved by both the Site Director and the Vice President, New Projects.

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.

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 EMPLOYEE CONCERNS

4.1 Implementation

The ECSP resulted in WBN corrective actions which are being administered under Corrective Action Tracking Documents (CATDs). A responsible organization is assigned for implementation of each CATD. These corrective actions are tracked on the TROI system. Corrective actions identified by the new ECP are also tracked in TROI.

4.2 Verification and Closure

When the responsible organization completes the corrective action, it provides objective evidence of completion to the ECSP closeout team within the new ECP. The ECSP closeout team closes the CATD when appropriate and also provides a final closure report for the full scope of WBN CATDs. Corrective actions completed as a result of the new ECP investigations are closed by the ECP staff.

5.0 QUALITY VERIFICATION PROCESS

Site Quality Assurance will perform verification to ensure that quality-affecting activities at WBN are properly carried out. The Integrated Verification Plan (IVP), 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. 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.
- Activities critical to safety or having the most potential to impact safety.
- Revisions of the procedures that have been implemented recently.
- Activities that have not been monitored in the recent past or are performed infrequently.
- Activities that are performed by new personnel, contractors, or technicians.
- The requirements of applicable codes and standards that are mandated for the item or activity.

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.

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

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.

The IVP will take the form of a matrix listing specific functional areas such as operations, procurement, chemistry, and engineering, as well as such additional functional areas as CAPs, Special Programs, and other issues of concern at WBN. The functional areas will be cross referenced to the quality verification organizations and their degree of involvement, as shown in Figure IV-1.

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.

WATTS BAR IVP MATRIX

INTEGRATED VERIFICATION RESPONSIBILITIES MATRIX

ACTIVITIES	TYPE OF VERIFICATION																					
	AUDIT				REVIEW								MONITORING								INSPECTN	
	SITE	FREQ	CORP	FREQ	QE	FREQ	QS	FREQ	NDE	FREQ	QC	FREQ	QS	FREQ	QC	FREQ	QE	FREQ	NDE	FREQ	QC	FREQ
Operations (OP)																						
Licensing (LC)																						
Maintenance (MA)																						
Modifications (MD)																						
Radiation Protection (RP)																						
Installation Inspection, and Testing (IT)																						
Emergency Preparedness (EP)																						
Security and Safeguards (SS)																						
Fire Protection (FP)																						
Procurement (PR)																						
Training & Qualification (TQ)																						
Management Controls (MC)																						
Chemistry (CY)																						
Effluent Monitoring/ Radwaste Mgmt. (EM)																						
Engineering Design (ED)																						

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FIGURE IV-1

INTEGRATED VERIFICATION RESPONSIBILITIES MATRIX

CAPS	TYPE OF VERIFICATION																					
	AUDIT				REVIEW								MONITORING								INSPECTN	
	SITE	FREQ	CORP	FREQ	QE	FREQ	QS	FREQ	NDE	FREQ	QC	FREQ	QS	FREQ	QC	FREQ	QE	FREQ	NDE	FREQ	QC	FREQ
Cable Issues																						
Cable Tray Supports																						
DBVP																						
Conduit and Conduit Supports																						
Electrical Issues																						
Equipment Seismic Qualification																						
Fire Protection																						
HAAUP																						
Heat Code Traceability																						
HVAC Duct and Duct Supports																						
Instrument Lines																						
Prestart Test																						
QA/QC Records																						
Q-List																						
Piece Parts																						
Sesimic Response/ Analysis																						
Vendor Information																						
Welding																						

FIGURE IV-1

V. WATTS BAR MANAGEMENT AND ORGANIZATION

1.0 STRENGTHENING WBN MANAGEMENT AND ORGANIZATION

The CNPP describes the new 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.

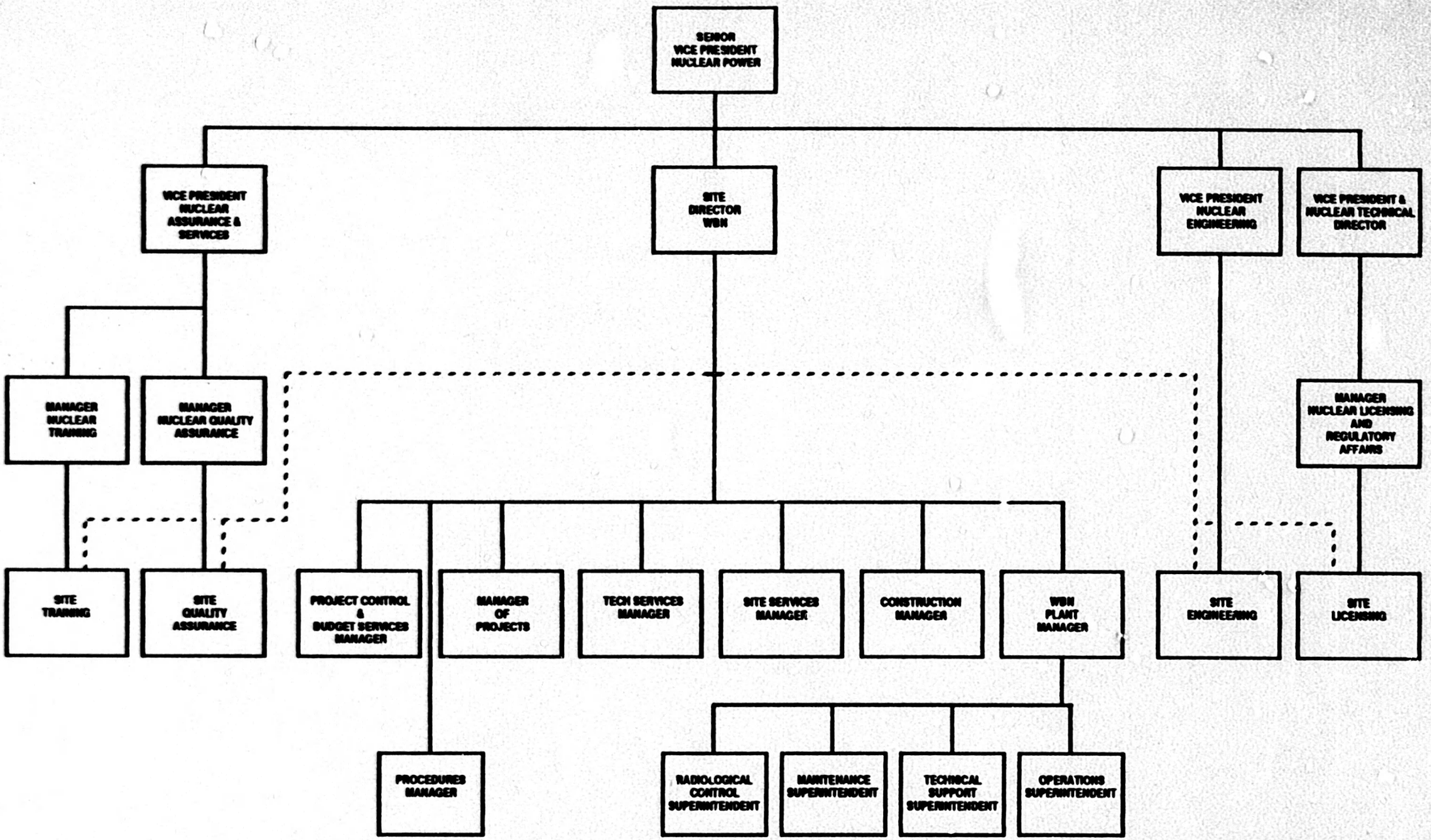
In a number of areas, WBN managers and their organizations lacked clear assignment of responsibility and authority. Accordingly, efforts have been made to clarify each manager's area of responsibility, establish accountability, and assure adequate resources to perform assignments.

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.

1.1 Strengthening Functional Support

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 will receive technical direction from its respective corporate department. The WBN Site Director is responsible for planning, scheduling, coordinating, and providing project direction for the activities of the site support organizations.

The WBN Site Director approves and controls activities conducted on site. The Site Director 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 Director 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 Director develops and implements site programs to ensure the performance and documentation of site activities in accordance with established quality program requirements and policies. The Plant Manager, Construction Manager, Site Services Manager, Manager of Projects, Project Control and Budget Services (PC&BS) Manager, Procedures Manager, and Technical Services Manager report directly to the Site Director. The Project Engineer (PE), Site Licensing Manager, Site Quality Manager, and Site Training Manager report to the Site Director for project functional direction, including scope and schedule. The WBN Site Director presently reports to the Senior Vice President of Nuclear Power. In the very near future the Site Director will report to the Vice President, New Projects.



- - - - - - Project Functional Direction by Site Director

WATTS BAR ORGANIZATION

FIGURE V - 1

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.

To ensure effective and consistent design and engineering control of WBN, design engineering personnel and functions have been placed under the WBN PE, who reports to the Vice President of Nuclear Engineering for technical direction.

To ensure effective and consistent application of the TVA QA program, site QA and QC functions have been placed under the Site Quality Manager. The Site Quality Manager reports to the Manager of NQA for administrative and technical direction.

TVA has placed responsibility for TVA nuclear regulation and licensing functions for WBN under the Site Licensing Manager. The Site Licensing Manager reports to the Manager of Nuclear Licensing and Regulatory Affairs for technical direction.

To ensure effective and consistent application of the nuclear training program, training of nuclear plant personnel has been placed under the Nuclear Site Training Manager. The Nuclear Site Training Manager reports to the Manager of Nuclear Training for technical direction.

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.

1.2 Specific Organizational and Management Improvements

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

1.2.1 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 by the Site Director. 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 obtain the necessary information needed for project definition. The Project Manager works closely with Engineering, Construction, 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 typically report to the Manager of Projects, who reports directly to the Site Director. Some Project Managers have been selected from within various WBN line organizations and report to a senior manager who reports to the Site Director.

1.2.2 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 PE. The WBEP was relocated to the plant site in 1986. The PE is assigned the engineering resources to perform the plant-specific engineering work. The PE's project team is comprised of engineers from each of the engineering disciplines, assigned to WBEP by discipline department managers. The department managers report to the Chief Engineer who in turn reports to the Vice President, Nuclear Engineering, and have technical responsibility for the engineering activities performed by discipline personnel assigned to WBEP.

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 by WBEP under the control of the PE includes: calculations, engineering support for licensing, design systems engineering, technical requirements for procurement, and handling of design-related CAQs.

The PE 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. Each

discipline at WBN is headed by a lead discipline engineer who takes functional, day-to-day direction from the PE and who receives technical direction from the discipline department manager. The PE and lead discipline engineers implement design controls, procedures, techniques, and methodologies developed and controlled by the discipline department managers. The discipline department managers provide technical direction and support to the project when required. The lead discipline engineer ensures that WBN is staffed with the proper types and numbers of discipline engineers and 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 CAQs.
- 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 2.8.

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

1.2.3 Quality Assurance

In the past, TVA's nuclear QA and QC functions were not unified under a single department, nor did nuclear QA and QC groups report to as high a level of management within TVA as other organizations. As a result, nuclear QA and QC activities could be performed without a consistent set of programs or procedures. To help ensure a more consistent implementation of the QA program, the QA organization has been restructured and placed under one manager, the Vice

President of Nuclear Assurance and Services, who reports directly to the Senior Vice President of Nuclear Power. The Manager of NQA reports to the Vice President of Nuclear Assurance and Services, and has direct, unencumbered access to the Senior Vice President of Nuclear Power and other Vice Presidents regarding quality matters.

The Site Quality Manager reports to the Manager of NQA for technical direction and is responsible for establishing and maintaining a site QA organization that performs the quality engineering, quality control, 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 CAQ data base) and the QC Inspection system (the inspection data base) for the site.

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.

1.2.4 Licensing and Regulatory Compliance

As described in the CNPP, the licensing activities for WBN are now under the control of the Manager, Nuclear Licensing and Regulatory Affairs, which is under the Vice President and Nuclear Technical Director, to improve TVA's oversight and direction of nuclear licensing activities. A Site Licensing organization has been established for WBN-specific licensing activities to be the primary interface with NRC onsite. This will increase the resources available to the Site Director while improving central direction.

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.

Incident reports will be prepared by involved line organizations. When required these reports will be reviewed and processed for submittal as LERs to NRC by Site Licensing. Site Licensing will ensure that reportability decisions are made in a conscientious, professional, and conservative manner. NUREG-1022 (including supplements 1 and 2) will be utilized in maintaining the quality of LERs. 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 CAQs 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.

1.2.5 Watts Bar Nuclear Construction (NC)

Nuclear Construction is responsible for ensuring that construction activities are accomplished in accordance with approved design documents and applicable requirements. This responsibility resides with the WBN Construction Manager who reports both technically and administratively to the WBN Site Director.

To enhance the accountability and control of construction activities, the Construction Manager has established a Field Engineering Department and a Field Superintendent Department to clarify and define craft and engineering functions. 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.

- The implementation workplan which is developed by NC for safety-related equipment is reviewed by the Plant Manager's organizations and the Site Quality Manager's organization to ensure that the plant administrative and quality requirements are appropriately addressed.

- TVA employment practices for temporary hourly craft personnel have been changed to stabilize the modification work force core group. Formerly, temporary hourly personnel were terminated after 11 months and 29 days, causing an influx of new craft personnel. The new TVA practice of allowing core group craft workers to remain indefinitely, will result in improved productivity, quality, and accountability for the work.

- The NC craft organization is staffed with an adequate number of managers and foremen to ensure that the span of control for these supervisors will achieve close supervision in the workplace and improve control of the work.

- NC supports the Design Change Process outlined in Section 2.8 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 NC. This has allowed NE personnel to be involved with NC personnel on a daily basis to help resolve field installation problems. NE and NC can more easily hold coordination meetings and perform constructibility walkdowns during the course of the modification process to identify any potential installation problems.

1.2.6 Project Controls and Budget Services

The PC&BS staff is responsible for the development and maintenance of the site integrated schedule (SIS), which 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.

In May 1986, the WBN Planning and Scheduling Staff was restructured to report directly to the Site Director and given the responsibility of developing and maintaining the unit 1 SIS. This change focuses top management attention

on an integrated planning and scheduling approach, resulting in more accurate and realistic planning, scheduling, and cost monitoring. By mid-1987, the integration process was complete.

1.2.7 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 Superintendent, who is responsible for plant operations, and the Technical Support Superintendent, who is responsible for technical support.

Also reporting to the Plant Manager are the Maintenance and Radiological Control Superintendents. The Maintenance Superintendent is responsible for the overall plant maintenance program, further described in Section 1.2.7.3. The Radiological Control Superintendent is responsible for the Plant Radiological Control Program, further described in Section 1.2.7.4.

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.

1.2.7.1 Operations

<u>Operations Responsibilities</u>

The Operations Superintendent is responsible for planning, directing, coordinating, and setting standards for the Operations activities of the plant, and preparing recommendations for improvements in plant operation. 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 Operations managers. 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 Operations managers are responsible for the preparation and maintenance of up-to-date operating procedures and the preparation of operating records. The Operations managers are also responsible for the operating personnel schedules and are charged with the responsibility of keeping the Operations Superintendent fully informed of matters of operating significance.

In addition to their responsibilities for direct operation of the plant, Operations personnel provide support for preoperational testing, fuel loading, startup, and surveillance testing. They also provide the nucleus for emergency teams such as the plant rescue and firefighting organizations.

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 relationship between Operations managers and Operations employees.

  - 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.

- 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, will be utilized in advisory positions during WBN startup. See section 2.3 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 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 post review 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 post review of revised SIs. This Site QA review indicated that SIs for modes 5 and 6 were acceptable. An additional NRC inspection of modes 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 mode 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.

1.2.7.2 Technical Support

The Technical Support Superintendent reports directly to the Plant Manager. This superintendent is responsible for planning, directing, and coordinating the technical support activities of the plant. This superintendent directs preparation and implementation of system and component testing programs, preoperational, startup and prestart test programs, system engineering program, the chemistry and environmental program, and the STA program.

The Technical Support Superintendent is responsible for the following programs:

- Implementing and maintaining programs for ASME Section XI pump and valve in-service testing, secondary side performance, 10 CFR 50 Appendix J local and integrated leak rate testing, and heat exchanger performance.

- 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.

- Water chemistry control, the operation of the Radiochemical Laboratory, environmental monitoring and control of plant effluents, hazardous waste control, soil erosion, spill prevention, waste oil, air pollution control permits, and plant layup coordination.

- In coordination with Maintenance, 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.

- The Preoperational Test Program and Prestart Test Program.

- The STA Program qualifies engineers to provide technical advice and engineering expertise to the SOS. The STA provides this information during normal operations and during nuclear plant accidents, abnormal conditions, and for inoperable or out-of-service equipment.

1.2.7.3 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 indu experience. These initiatives will emphasize improvements in these areas as delineated in the CNPP.

The Maintenance Superintendent reports directly to the Plant Manager. The superintendent is responsible for planning, directing, and coordinating plant maintenance activities. The superintendent 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 superintendent coordinates changes in maintenance procedures and is responsible for supervision of day-to-day plant maintenance activities.

The Maintenance Superintendent 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.

- Maintenance trending including the Nuclear Plant Reliability Data System.

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

- Building maintenance and cleanup activities, handling and packaging of radioactive waste material, solid waste management, cleanup of oil and chemical spills, and coordinating plant and material decontamination activities with health physics personnel.

1.2.7.4 Radiological Control

The Radiological Control Superintendent reports directly to the Plant Manager. This superintendent is responsible for planning, directing and coordinating the Radiological Control activities of the plant. This superintendent directs the preparation and implementation of the Radiological Protection, Radiological Health, Radiological Field Operations, and Radioactive Waste Programs. This superintendent 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.

- Providing audits/assessments on the implementation of the Radiological Control Program, and implementing the Radiological Corrective Action Programs to ensure that CAQs 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.

1.2.8 Training

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 Director for project functional direction.

The WBTD provides training services to the site which includes:

- 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 2.3 for a more detailed discussion of the WBN training programs.

1.2.9 Technical Services

The Technical Services organization provides site procurement services; provides warehousing receipt, storage, and issue of permanent plant and construction-use materials; coordinates with Document Control and Records Management the control, processing, and storing of approved documents, drawings and records; provides onsite computer support; and maintains and operates site tool rooms (including material and test equipment) for all site organizations.

1.2.10 Site Services

The Site Services Manager reports directly to the Site Director and is responsible for radiological emergency planning, fire protection, site industrial safety, support services, site security, and medical services.

These programs consist of the following activities:

- Fire protection, prevention, suppression, and risk protection.

- Emergency response for personnel injury and hazardous material accidents.

- Industrial safety, health, and risk protection including the hazardous materials program and respiratory protection program.

- Project management for facilities upgrades.

- 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.