V. RESTORING EMPLOYEE CONFIDENCE IN TVA NUCLEAR MANAGEMENT

A. Introduction

During late 1984 and 1985, the NRC and some members of Congress received expressions of concern from TVA employees regarding the quality of TVA's nuclear activities and expressions of fear that TVA would take reprisals against them if they expressed their quality concerns directly to TVA management. Additionally, TVA had received many employee concerns through its own system. These employee concerns indicated that many TVA employees had lost confidence in TVA's nuclear management and its ability to ensure that TVA's nuclear activities are properly conducted.

TVA has and is taking several steps to remedy this problem. As discussed above, TVA has installed a new nuclear management workforce to provide leadership and direction for TVA's nuclear program. Furthermore, as is discussed in the following sections, TVA has improved and is improving its nuclear management systems and is also taking steps to improve various programmatic elements of its nuclear program. These actions have been effective and they have contributed greatly to a restoration of employee confidence in TVA's nuclear management.

Additionally, TVA has taken several steps which are directly intended to restore employee trust in TVA nuclear management and to instill an atmosphere which is conducive to quality. In general,

these steps consist of (1) establishing a system in which employees can express their concerns regarding quality or safety to TVA's nuclear management without fear of reprisal and with assurance that their concerns will be fully addressed, and (2) establishing a policy which promotes quality, ensuring that TVA's employees are aware of this policy, and taking disciplinary action against those who act contrary to this policy. Each of these is discussed below.

B. Establishing A System To Receive Employee Concerns

In 1985, TVA established the Special Program at Watts Bar for resolving employee concerns. This program was to identify, investigate, and resolve concerns related to the construction of the Watts Bar Nuclear Plant. Given the large number of concerns received from this special program, TVA has also established a TVA Employee Concern Program for all of its nuclear activities. Each of these programs is described below.

1. Special Program at Watts Bar for Resolving Employee Concerns

In 1985, TVA established the Employee Concern Special Program (ECSP) designed to elicit any employee concerns related to construction of Watts Bar. This program consisted of hiring an independent contractor, Quality Technology Company (QTC), to interview all TVA employees associated with Watts Bar and establishing a hot line to receive concerns from other TVA employees. Measures were taken to protect the confidentiality

of employees who expressed concerns. Responsibility for conducting or overseeing investigation of the substance of safety concerns was in the Nuclear Safety Review Staff (NSRS) which, at that time, reported to the General Manager and Board of Directors. The NSRS role has been restructured and responsibility for investigating all employee concerns generated prior to February 1, 1986 was transferred to the Employee Concern Task Group (ECTG).

Following completion of the initial interview process, the QTC contract first was extended and then reduced in scope when TVA determined that a more effective process for resolving concerns was needed. QTC has been required to retain and store the original QTC files but has turned over copies of those files to the NRC. QTC and the NRC are also ensuring continued confidentiality of employees expressing concerns. In order to identify safety-related issues to TVA without breaching confidentiality agreements, the NRC has examined each QTC file and deleted information from the QTC file documents which could reveal the identity of a confidential source (sanitized). After screening and sanitizing by the NRC, the QTC sanitized records have been provided to the TVA Inspector General (IG) for a second screening to assure confidentiality. Once the TVA IG screening was complete, the NRC identified issues were transmitted to the ECTG for evaluation and resolution.

As a result of the Special Program, employee concerns regarding TVA's nuclear plants and corporate offices have been identified and investigated. Corrective actions have been identified by appropriate nuclear organizations and corrective action plans have been accepted by ECTG. All corrective action plans are being tracked on TVA's TROI system.

a. Resolution of Concerns

TVA reviewed concerns individually or collectively as appropriate to determine the proper resolution for each issue. In addition, in order to provide for evaluation of related concerns and determine whether a generic concern exists, TVA divided all concerns into the following nine categories: Quality Assurance (QA)/Quality Control (QC); Material Control; Management and Personnel issues; Intimidation, Harassment, and Misconduct; Operations; Welding; Construction; Industrial Safety; and Engineering. The Inspector General investigated concerns that involve intimidation, harassment, misconduct, and wrongdoing. Each of the remaining eight categories of concerns was assigned to a review group of senior TVA and/or contractor personnel for further evaluation. In general, the review groups performed the following functions:

- As appropriate, the review groups divided the concerns into subcategories and established an approach and schedule for reviewing the concerns in each subcategory.

- The review groups then reviewed each category or subcategory of concerns, determined whether any generic condition exists, and evaluated the significance of any such condition. The review groups provided these conditions to the line organizations who determined whether any concerns or group of concerns represented a condition which might be reportable to NRC pursuant to 10 CFR 50.55(e), 10 CFR 50.72, 10 CFR 50.73, or 10 CFR Part 21.

- After each review group identified a generic condition, that group performed a root cause study of each such condition and required TVA line management to evaluate the condition and recommend action to remedy the root cause of the condition. The review group then determined whether or not the corrective action was acceptable. If the review group and line management did not agree as to the corrective action, their differences were documented and escalated to the Senior Vice President, Nuclear Power, for resolution. The responsible TVA nuclear organizations are implementing the corrective actions.

- The review groups prepared a report which formed the basis for closing the specific concerns in each category. The reports include a section outlining TVA's planned actions to resolve the concerns.

- Verification of corrective actions is being accomplished in accordance with approved procedures.

The Inspector General investigated and reported separately on cases involving wrongdoing, misconduct, intimidation or harassment.

TVA also established a Senior Review Panel to review the categorization of the concerns, the root cause analyses, and the proposed corrective actions. The Senior Review Panel was comprised of nuclear industry experts from outside TVA who report to the Senior Vice President, Nuclear Power.

b. Reporting of Results

TVA is making the results of the Watts Bar Employee Concern Special Program (WBECSP) available to all present TVA nuclear employees. The results consist of one summary report, nine category reports, and 107 subcategory reports. The Inspector General investigated and reported separately on cases involving wrongdoing, misconduct, intimidation or harassment. The summary report is available for review 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 report was issued.

Through this Special Program, TVA has taken steps to ensure that employee concerns are evaluated and that any conditions adverse to quality identified as a result of these concerns are corrected. As part of the evaluation, TVA reviewed the concerns to determine whether any generic problems exist and performed a root cause analysis for the purpose of developing action to preclude recurrence of the problems.

In support of Sequoyah Unit 2 restart, a results feedback station was established at the SQN site. The station provided information regarding the disposition of specific concerns so that interested individuals could determine what actions were taken in response to their concern. The NRC lent vital assistance with the identification of specific concerns in a manner consistent with the confidential nature of the information. In addition, a schedule for opening review stations at each site, Chattanooga and Knoxville was established and publicized to make information describing TVA actions to resolve employee concerns available to current and former TVA employees. The ECSP reports will be permanently maintained in document control center at nuclear sites, Chattanooga and Knoxville.

On October 1, 1988, the new Employee Concern Program assumed the remaining responsibilities of the Special Program. The new program will complete the distribution of the reports, employee feedback, and the corrective action verification

and closures. The new program will utilize the reports, databases, and casefile information to ensure that new or ongoing concern investigations have the full benefit of the extensive investigation and analytical work of the Special Program.

c. NRC Staff Review of Employee Concerns Special Program

The NRC staff reported the results of their Safety Evaluation on the Employee Concern Special Program (ECSP) on October 6, 1987 (Reference 11). In this report the NRC staff concluded that the ECTG program "is an acceptable program for evaluating and providing corrective actions to the employee concerns addressed by the program."

2. TVA's Nuclear Power Employee Concern Program

TVA received numerous employee concerns through the Special Program at Watts Bar. Recognizing the importance of assuring that employee concerns with respect to quality and safety are fully and effectively addressed throughout Nuclear Power, TVA established an Employee Concern Program for the entire Nuclear Power organization. TVA policy assigns responsibility to employees to report any concern they may have to their supervisor and up through line management if necessary. Line management has responsibility for the quality and safety of activities under its control and for the resolution of any

problems which may arise in those activities. Accordingly, if the managers are to function effectively, they must be aware of employee concerns regarding the quality of the activities for which they are responsible. TVA also has a policy which prohibits intimidation, harassment, or reprisal against employees who raise concerns. Nevertheless, TVA realizes that, for a variety of reasons, some employees may be reluctant to report their concerns to supervisors and line management. This will be especially true until employee confidence in TVA's nuclear management is restored. Consequently, TVA is providing alternative means for employees to express their concerns.

TVA established a new Employee Concern Program to receive and evaluate employee concerns regarding any of its nuclear activities. This program takes advantage of the lessons learned from the Special Program at Watts Bar and reflects the long-term needs of TVA. The Employee Concern Program as described in TVA's May 2, 1986 submittal to the NRC (Ref. 4) is summarized below.

a. The new Employee Concern Program is headed by an Employee Concern Program Manager who reports to the Manager of Nuclear Human Resources. The Employee Concern Program Manager has direct reporting authority to the Senior Vice President, Nuclear Power for significant safety concerns and differing professional opinions. The Employee Concern Manager has direct report full-time Site Representatives

from each major nuclear site and major corporate nuclear location. Each location utilizes standard procedures, documentation, and recordkeeping, and contributes to a common data base of information regarding employee concerns.

b. The Site Representatives are responsible for receiving and investigating employee concerns, ensuring resolution of the concerns, providing feedback to the employees who express concerns, and documenting this process. Employees can express concerns to the Site Representatives through several different means. This includes mail-in forms, telephone calls, walk-in interviews, and the opportunity to participate in exit interviews for transferring or terminating employees is afforded. Any employee who expresses a concern may request that his identity be kept confidential. A special orientation program for all employees has been completed to inform them of how the program works.

The Site Representatives periodically determine employee understanding of and satisfaction with the Employee Concern Program through several means, including interviews and management and employee feedback. Additionally, information regarding individual employee concerns are input into a computerized data base, and evaluations are performed 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. Unlike the Special Program established for Watts Bar, the new Employee Concern Program does not utilize an independent contractor such as QTC, but instead relies upon a system which reports to TVA's nuclear line management. This arrangement has several advantages. First, it unifies the responsibility for receipt, investigation, and resolution of the concerns in one group, thereby allowing for more timely and effective corrective action. Second, it ensures that the organization which is responsible for the quality and safety of its activities is also responsible for ensuring that the quality concerns of its employees are identified and resolved. Finally, by providing the Employee Concern Manager direct access to the Senior Vice President, Nuclear Power, it provides employees with a means for reporting their concerns to a high-level within TVA's nuclear organization if, for any reason, the employees do not believe that their supervisors would properly respond to expressions of concern.

d. In addition to TVA's Employee Concern Program, TVA's Inspector General operates a telephone hot line and has other means to receive allegations and concerns. Since the Inspector General reports directly to TVA's Board of Directors, TVA employees have a method of expressing concerns which are separate from Nuclear Power. Additionally, those employee concerns that Nuclear Power has determined involve intimidation or harassment and appropriate

misconduct concerns are referred to the Inspector General. Employees are also free to go directly to the Board or outside TVA and express any concerns to the NRC and other governmental bodies.

e. In sum, TVA encourages employees to express their concerns so that prompt and effective corrective action can be taken. In particular, by establishing the Employee Concern Program, TVA has provided a means by which employees can present concerns in confidentiality to a high level of nuclear management, while ensuring that line management has sufficient authority to obtain resolution of and corrective action for the concerns. TVA has confidence that this Program will help restore employee trust in TVA's nuclear management.

f. The NRC staff reported the results of their Safety Evaluation on the Employee Concern Program on September 30, 1987 (Reference 12). In this report the NRC staff concluded that "the ECP established on February 1, 1986 is an acceptable program for handling employee concerns."

C. Instilling an Atmosphere Conducive to Quality and Safety

For many years, TVA has had an official 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). TVA's Board of Directors reiterated this policy in a policy statement issued in April of 1985 to all TVA employees. Specifically, the Board stated that:

> The TVA Board members, individually and collectively, have a personal, as well as a corporate, commitment to the protection of public health and operation of TVA nuclear facilities. Each employee involved in our nuclear effort has a responsibility for the proper and safe execution of all TVA job functions. In addition, as a matter of policy, TVA actively solicits comments from all employees about matters that may have safety implications. You should be aware of the ways to share your views about safety with TVA management and the NRC. We want to assure you that you are encouraged to come forward and that there will be no retaliation if you report something which you believe is not right. It is only through your help that we can maintain the "safety-first" standards of TVA.

TVA continues to support this policy, and it believes that the themes expressed in this policy statement are essential to the safety of TVA's nuclear program.

Given the large number of employee concerns expressed during late 1984 and in 1985 outside the normal chain of management (especially expressions of fear of reprisals for raising concerns related to quality), it was apparent that the Board's policy was not always being taken seriously by every TVA nuclear manager and supervisor.

In response, TVA took action to ensure that (1) safety and quality are the paramount consideration of every TVA employee, (2) that each individual takes responsibility for the quality and safety of the activities performed by him or under his direction or review, and (3) that employees are not intimidated from or harassed for expressing concerns.

First, TVA took steps to ensure that its employees understand TVA's commitment to this policy. The Senior Vice President* met with TVA's nuclear managers and employees to impress upon them that safety and quality are of paramount importance and that each individual is held responsible for the quality of his work. In particular, the Senior Vice President clearly stated that he would not tolerate intimidation or harassment of any kind. TVA's nuclear managers have been instructed to reinforce this policy in meetings with their subordinates.

Second, TVA's policy is being strictly enforced. Any individual who engages in intimidation or harassment of any kind is subject to swift and appropriate disciplinary action to the full extent permitted by law. Additionally, each individual is held accountable for the quality of his work and of the work of those whom he supervises, and TVA will take appropriate action with respect to those individuals whose work quality does not conform with applicable standards.

*Previously the Manager of Nuclear Power

Third, the Senior Vice President provides an environment that is conducive to excellence and professionalism. Management sets the example by conducting itself with commitment and integrity. It establishes safety as a personal and moral responsibility. It maintains an atmosphere of open communication and sets goals of continual improvement in performance.

In sum, TVA has a policy which promotes quality and safety, and it has taken steps to ensure that this policy is understood by TVA employees and is strictly enforced. Together with the other improvements which TVA is implementing, these steps are restoring the confidence of employees in TVA's nuclear management.

VI. IMPROVEMENTS IN TVA'S NUCLEAR MANAGEMENT SYSTEMS AND PROGRAMS

A. Introduction

As discussed above, the primary cause of the problems in TVA's nuclear program was a lack of a sufficient number of experienced nuclear managers who could provide the necessary leadership and direction of TVA's nuclear activities. TVA has established a new nuclear management workforce to cure this problem.

Another cause of the problems in TVA's nuclear program (which is related to and derives from TVA's lack of a sufficient number of experienced nuclear managers) relates to TVA's nuclear management systems and programs. This section of the report identifies the problems in TVA's nuclear management systems and programs, and it discusses the steps which TVA has taken and will take to correct those problems and improve TVA's nuclear management.

B. Increasing Upper Management Awareness of Nuclear Activities

Some of the problems in TVA's nuclear program have been recurring or have persisted for a significant period of time without effective corrective action being taken. To a large extent, this situation was attributable to a lack of management awareness of the problems and a lack of management involvement in formulating corrective action. In order to provide assurance that TVA's management will be aware of significant problems and involved in their resolution, TVA is taking the steps discussed below.

1. Briefings and Reports for the Board of Directors

The TVA Board of Directors and the Executive Vice President and Chief Operating Officer are being kept informed of developments and problems in TVA's nuclear program through a number of independent sources. First and primarily, the Board is kept informed through the Senior Vice President's direct reporting relationship with the Board. Second, the Board is kept informed through TVA's new Inspector General. Also, TVA has arranged for The Institute of Nuclear Power Operations (INPO) to conduct an annual corporate evaluation of its program. The Board will be directly involved in receiving INPO's findings. Each of these sources is discussed below.

a. The Senior Vice President has the responsibility to keep the TVA Board of Directors informed of the performance of TVA's nuclear plants. This is accomplished through various types of briefings of the Board, including the following:

- The TVA Board and Executive Vice President and Chief Operating Officer receive periodic performance briefings from the Senior Vice President or his designee on progress toward specified goals and objectives for the nuclear power program. These briefings take many forms including operations meetings with the Chief Operating Officer, Management Committee meetings and written reports. Potentially significant nuclear safety issues

are highlighted. Special attention also is given to programmatic issues such as current employee concerns and quality assurance issues noted by NRC.

- In addition to the briefings described above, the Senior Vice President typically has frequent informal conversations with one or more members of the Board. These conversations represent a significant means for informing Board members of developments in TVA's nuclear program.

- The Senior Vice President also informs the Board of nuclear plant events and other nuclear developments warranting its attention as they occur.

In sum, these briefings assure that TVA's Board of Directors is provided with sufficient information to enable the Board to take whatever action may be necessary to correct any problems which may arise in TVA's nuclear program.

b. The TVA Board has also established an Office of Inspector General, which is independent of the remainder of TVA's organization and which reports directly to the Board of Directors. The plan approved by the Board of Directors for the creation, structure, authority, and function of the Office of Inspector General is provided in Appendix 5A.

The duties and responsibilities of the Inspector General as approved by the TVA Board are set forth in Appendix 5B.

The TVA Office of the Inspector General (OIG) is a unique organization within TVA with special responsibilities and functions. The TVA Inspector General is responsible for conducting and supervising audits and investigations of all TVA activities, providing leadership in promoting efficiency and effectiveness within TVA, detecting and preventing waste, fraud, and abuse, and informing the Board of Directors and Congress of problems and necessary corrective actions.

The office consolidates TVA's audit and investigative functions under a single official, free from any undue influence or constraints.

The OIG's functions and responsibilities help promote employee confidence in the management of the TVA nuclear program by serving as a "safety valve" for managers and workers. Any employee may bring his or her concerns directly to the Inspector General, where allegations of violations of law or regulation, waste, fraud, abuse, harassment, or other misconduct will be investigated and resolved by persons independent of TVA line management.

Employees may also express their views through Nuclear Power's employee concerns program, but if they are

dissatisfied with the results of that process, they can go to the OIG.

Any employee concerns or complaints that relate to violations of laws or regulations, waste, fraud, abuse, harassment or other misconduct and which are made or referred to the OIG are investigated independently and the results of the investigation provided to Nuclear Power. In those cases which require corrective action, timeframes are established by the Inspector General within which to make necessary corrections. Failure to make necessary corrections in a timely manner is reported to the Board and to Congress through the Inspector General's semiannual report and other means.

With respect to employee concerns, the OIG's activities contribute to a workplace environment in which TVA employees are free to express their views without fear of harassment or intimidation. The OIG will investigate and report on acts of reprisal, harassment, or intimidation; and nuclear program managers or employees who have committed such prohibited activities will be subject to disciplinary measures, up to and including termination. The OIG also audits the effectiveness of Nuclear Power's employee concerns program, and thus ensures that employee concerns are handled effectively by Nuclear Power.

Finally, as OIG addresses various individual allegations and complaints and audits Nuclear Power's employee concerns program, it endeavors to identify trends, generic problems and systemic deficiencies, including past management shortcomings, that are contributing to TVA's present difficulties.

TVA has hired Norman A. Zigrossi as the Inspector General. Before being hired as the Inspector General, Mr. Zigrossi was a special agent in charge of the Federal Bureau of Investigation's field office in Washington, D.C. Mr. Zigrossi is well qualified to act as TVA's Inspector General.

c. In addition to the previous measures, TVA has arranged for INPO to conduct an annual corporate evaluation of its nuclear program until it is clear that the actions taken to strengthen our management and improve TVA's nuclear performance are being sustained. INPO has agreed to do this. The Board will be directly involved in receiving INPO's findings.

d. Finally, TVA has strengthened the structure and organization of the already existent Nuclear Safety Review Boards (NSRBs) by adding 13 outside experts as consultants. A list of these individuals is provided as Table 3 in section IV. Although these Boards report to the Senior Vice President, all minutes of their meetings and their reports are provided to the Board of Directors.

2. Briefings and Reports for the Senior Vice President, Nuclear Power

The Senior Vice President will be kept informed of developments and problems in TVA's nuclear program through a number of primary mechanisms:

a. As the manager with responsibility for the day-to-day management of TVA's overall nuclear program, the Senior Vice President is in frequent contact with his staff and line managers and therefore routinely learns of any significant developments and problems in the program.

b. The Senior Vice President holds regular meetings with his staff and line managers and receives regular reports from them identifying any significant developments or problems. For example, the Senior Vice President receives a morning plant status report which provides the status of Sequoyah and Browns Ferry. This information includes operating statistics, NRC and other Regulatory Notifications, significant plant events or problems, and off-normal conditions or significant equipment deficiencies. Also, a newly approved procedure on Investigation and Reporting of Abnormal Events requires the Senior Vice President to be immediately notified of significant plant abnormal events. He also receives, within 24 hours after the event, a written report which contains detailed information concerning the investigation, causes and specific facts pertaining to the event.

c. The Nuclear Manager's Review Group (NMRG) has been established and reports to the Vice President Nuclear Assurance and Services. The NMRG performs investigations and reviews of suspected or known problem areas throughout the nuclear program for the Senior Vice President. NMRG reports are provided to the Vice President Nuclear Assurances and Services and to the Senior Vice President. The Manager, NMRG, also briefs the Senior Vice President on the progress and results of NMRG efforts as requested.

Since its formation from the former Nuclear Safety Review Staff (NSRS) in April 1986, the NMRG has been reorganized and restaffed to substantially increase the operational plant knowledge and experience that can be brought to bear on assessment of problem areas. The NMRG has completed major reviews in the areas of operational readiness, maintenance, corrective action, abnormal event processing, operations and operations training, effectiveness of time management, radiological protection, and radiological work practices. The group has also performed in-depth reviews of specific events at Sequoyah and Browns Ferry.

d. Finally, the Senior Vice President receives reports from the Nuclear Safety Review Boards (NSRBs) which conduct independent reviews of TVA's nuclear safety-related operating activities, programs, and events. The NSRBs have been enhanced by the addition of 13 outside consultants.

3. Conclusions

In order to enable upper management to provide timely and effective corrective action for significant problems in TVA's nuclear program, TVA has taken several steps to keep upper management informed of problems as they develop. Most importantly, consolidation of TVA's nuclear organization has and will continue to facilitate the flow of information up to TVA's senior management, and the hiring of additional experienced nuclear managers will provide TVA with the managerial resources to develop timely and effective corrective action for nuclear activities. To provide further assurance that TVA's Board of Directors is adequately informed of any significant problems which may develop, it receives regular briefings and reports from different sources (Senior Vice President, Inspector General, INPO annual corporate evaluations, and the NSRBs). Similarly, the Senior Vice President remains aware of developments in TVA's nuclear power program through his day-to-day management of the program, regular meetings and reports from his staff and line managers, sources outside of line management and his staff, and through reports from the NSRB.

C. Improving Management Systems and Controls

Some of the problems in TVA's nuclear program involved insufficient programs and procedures, a lack of prior planning and integration of nuclear activities, and a failure to satisfy prior commitments.

Each of these indicates a weakness in the management systems and controls being utilized in support of TVA's nuclear program. The sections below describe the steps which TVA is taking to improve its nuclear management systems and controls.

1. Improvements in Programs and Procedures

As is discussed above, TVA's nuclear organization was not effectively centralized until 1986, and TVA's nuclear plants utilized programs and procedures which at times were different from those being used at the other plants. As a result, each of TVA's plants was not able to take full advantage of the lessons learned at the other plants or in the nuclear industry at large, nor was TVA able to receive the maximum benefit from its resources.

By consolidating its nuclear organization and assigning various headquarters departments responsibility for the technical adequacy of functional areas, TVA is able to utilize its available resources more fully to develop programs applicable to all of TVA's nuclear plants. Furthermore, by utilizing a central nuclear organization, TVA is able to monitor developments at each of its nuclear plants and the industry as a whole in order to determine whether any changes are warranted in the manner in which TVA's nuclear activities are conducted.

a. Nuclear Procedures Systems

TVA is developing a new system of Nuclear Power Policies, Directives, Standards, Procedures and Instructions to govern its nuclear activities, including activities at its nuclear plants. The Management Systems and Nuclear Procedures Manager reports to the Vice President, Nuclear Assurance and Services. This manager is responsible for managing the restructuring of the Nuclear Power procedures system and has been given adequate resources for accomplishing this effort. As discussed below, the actual development of the procedures will be performed on both short-term and long-term bases.

1) In the short-term, TVA has prepared 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. Whenever possible, the above procedures will be based upon those provisions of existing procedures which provide effective control of the activities in question. The end result will be approved procedures required for the startup, operation and support of the respective nuclear plant.

2) TVA has a long-term program to develop an integrated Nuclear Procedures System to aid the administration of Nuclear Power activities. This restructured Nuclear Power procedure hierarchy consists of five (5) levels of documentation designated as Policies, Directives, Standards, Procedures, and Instructions. The Nuclear Power Policies, Directives, and Standards are upper-tier documents which establish Nuclear Power management position and interface responsibilities, authorities, and uniform methods for implementing requirements. The Nuclear Power policies have been established in the Policy and Organization Manual. When issued, the lower-tier Procedures and Instructions represent a detailed extension of the upper-tier documents by delineating the responsibilities, authorities, requirements and actions to be accomplished at the user level.

b. Programmatic Controls

The establishment of this procedure system ensures Nuclear Power centralized control, technical uniformity, and continuity for the manner in which all corporate and site organizations interface. Nuclear Power Policies and Directives will be approved by the Senior Vice President, Nuclear Power. Nuclear Power Standards will be issued to govern activities to be performed by two or more organizational components where a uniform result is required. The

Vice President to whom responsibility is assigned approves and issues the Nuclear Power Standard after obtaining concurrences from those Vice Presidents and Staff Managers affected by the stipulated requirements. Nuclear Power Directives and Standards which establish the Nuclear Quality Assurance Program will either be approved or concurred with by the Nuclear Quality Assurance organization. Those procedures that implement the Quality Assurance Program are reviewed through the application of a graded approach. The site procedures and instructions will be governed by Nuclear Power Policies, Directives, and Standards. The long-term program to upgrade operating plant procedures is based on the establishment of a management system which will ensure that commitments and requirements are systematically identified and incorporated in the appropriate procedures. A procedure tracking system monitors the status (i.e. development, review, approval) of each level of documentation within the Nuclear Procedures System. Transition to the new Nuclear Procedures System is being accomplished in a planned and orderly manner.

c. Resources for Implementation

The Management Systems and Nuclear Procedures organization has the responsibility and authority to monitor and coordinate the development of Nuclear Power Policies, Directives and Standards as well as to upgrade Nuclear Power Procedures

and Instructions for each site. This organization will ensure that site Procedures and Instructions represent appropriate extensions of the requirements and responsibilities for functions specified in the upper-tier Nuclear Power Policies, Directives, and Standards. This is accomplished by the issuance of Nuclear Power Standards which require that commitments and requirements be systematically identified and incorporated in the site Procedures and Instructions. To facilitate this process controlled information systems are being developed.

The nuclear procedures functions are staffed at corporate headquarters with counterparts at the sites. The organization is staffed with technical as well as administrative personnel under the direction of the Management Systems and Nuclear Procedures Manager. They will support the line organizations in developing the nuclear procedures system by providing guidance, coordinating the review and approval process, scheduling, tracking, editing, verifying, and human factoring of procedures. This charter will exist throughout the short-term upgrade effort as well as on a permanent basis.

d. Conclusion

As a result of the foregoing improvements, Nuclear Power will have a set of nuclear directives and procedures to

control activities throughout the Nuclear Power headquarters and at each of its nuclear sites.

2. Improvements in Business Planning and Integration of Nuclear Activities

As discussed above, TVA did not have effective centralized management of its nuclear activities prior to 1986. Furthermore, TVA did not have a corporate-level nuclear office assigned the responsibility of business planning, scheduling, accounting, and budgeting the activities of TVA's various nuclear departments. As a result, the efforts of TVA's nuclear departments were not always integrated or performed in a timely manner.

TVA has taken steps to remedy this problem.

a. As part of the consolidation of its nuclear organization, TVA has established a Nuclear Business Operations organization reporting to a Vice President. This organization provides the overall direction to nuclear sites and headquarters departments in the execution of business planning and financial activities of TVA's nuclear activities. Areas where the central staff will improve upon existing practices include:

   - Development of a consistent approach to business planning, accounting, and budgeting throughout Nuclear

Power. This approach will provide a defined business plan and more meaningful and timely financial information to NP management.

- Development of a process for performing analysis of cost and budget information so that trends can be established and variances identified to management for corrective action where appropriate.

- Creation of reports tailored to various levels of management, including summary level reports for the Senior Vice President, NP.

In addition to providing overall direction for business planning and budgeting, the Nuclear Business Operations organization has the responsibility for conducting periodic reviews of nuclear sites and headquarters departments to verify that implementation and execution of business planning and budgeting programs are effective and consistent with corporate policy and direction.

b. The Special Projects organization under the Vice President and Nuclear Technical Director provides direction to nuclear sites and headquarters departments in the execution of planning, scheduling, cost estimating and project management activities for major Nuclear Power projects. The Special Projects organization is also responsible for selected major

projects from initiation to completion and acceptance. Use of a project management approach is part of the comprehensive business planning system to ensure continuing oversight, assessment, and management of a project's quality, budget, and schedule performance. The Special Projects organization also has responsibility for the development of Integrated Living Schedule (ILS) program for TVA's operational nuclear plants. The Integrated Living Schedule (ILS) program will include three elements each with a different planning horizon for TVA's operating plants. The three planning elements are: a five year Long-Range Plan, a Annual Operating plan for the current fiscal year and a Refueling Outage Plan which details the next three refueling outages for each operating plant. Implementation of this ILS program will be an ongoing effort applied to each nuclear plant as it reaches operational status.

c. Responsibilities for developing and maintaining nuclear management information systems have been consolidated into Nuclear Assurance and Services. This will provide central control to ensure coordination and compatibility as well as system integrity while, at the same time, permitting the lower tiers of the organization to obtain information and reports consistent with their management needs.

Nuclear Assurance and Services is developing a system of data bases to be utilized by the Nuclear Sites and other

Nuclear Power departments. Systems presently under development or planned will support plant maintenance, design change control, plant equipment management, materials, and radiation control. The foundation of the above systems, as well as future systems, is a comprehensive nuclear industry based business information model and data architecture which provides for the design of the integrated data bases of sharing computer-stored data among all nuclear organizations. For example, the Configuration Management function will use the controlled master equipment list and the master design document list. The design is being guided by the following principles:

1) A given item of data, such as a letter received from the NRC or the status of a particular corrective action or a contract being awarded, will be recorded only once. This saves time by eliminating duplicate efforts and minimizing data entry costs.

2) Data will be recorded and stored in a single location with appropriate backup. This minimizes duplicated files and the errors that occur when attempts are made to maintain the same data on several data bases. It also reduces the cost of storage and inconsistency that occurs in reports that are drawn from separate sources. Whether the "single location" is a central computer or a node in a network of computers will depend on several considerations.

3) Controlled input access will be maintained to prevent unauthorized file changes while making data available to users.

Nuclear Assurance and Services will also maintain the integrated nature of the information systems and of the data bases by planning and managing changes to the computer programs and the associated procedures, by controlling the implementation of additions and enhancements to the computer software, and by executing the computer code with appropriate backup, recovery, and security functions. The application owner organizations that supply input data will be responsible for the authenticity, accuracy, and completeness of their inputs, and, in many cases, for the entry of that data into the systems. The nuclear management information systems will have interfaces to other TVA corporate systems such as TVA's new Accounting Information System.

The integrated data bases that are part of the overall nuclear information systems architecture will be available to serve operations, engineering, construction, quality assurance, and corporate nuclear management. Use of such centralized systems with the appropriate security, management controls, availability, and reliability will help assure that nuclear management, at all levels, will have sufficient information about the activities of each nuclear department in TVA.

d. In sum, TVA has established organizations responsible for managing centralized nuclear information systems and for planning, scheduling, and financial control of TVA's nuclear activities based upon input provided by responsible managers. These actions will provide assurance that TVA's nuclear activities will be adequately integrated and performed in a timely manner.

3. Improvements in Commitment Tracking

Over the years, each organization within the TVA nuclear program (including each of the nuclear plants) has tracked NRC commitments for which it was responsible using its own managerial and system tracking capability. This resulted in a multitude of commitment tracking systems and no centralized system. Thus, some commitments were not adequately tracked and closed by TVA. TVA has taken steps to remedy this situation.

TVA created a controlled data base for tracking formal commitments made to NRC. The Manager, NLRA is responsible for the administration of the commitment management and tracking program and associated data base requirements to ensure that commitments are met.

In order to maintain management control over commitments and ensure that commitments are documented and tracked, TVA requires that commitments be documented in formal correspondence to NRC

or other reports required by regulation such as Licensee Event Reports (LERs). It is also intended that those verbal agreements made by authorized Nuclear Power managers in he course of day-to-day working relations with the NRC will be documented and tracked on a central data base where the agreement commits the TVA organization to a future action. A procedure has been written to identify the authorized Nuclear Power managers and provide methodology for handling these verbal agreements.

Licensing personnel make the initial entry into the commitment tracking data base which identifies each commitment made to the NRC. When the action required to fulfill the commitment has been completed, a verification and completion form is sent to licensing, and the appropriate entry is made in the data base.

The responsible TVA management personnel are kept advised of the status of the open commitment items. The Vice President and Nuclear Technical Director or Manager, N' A's approval is required to change a forecast response or completion date for resolving a commitment.

Supervisors responsible for implementing commitments being tracke n the commitment tracking data base are also responsible for allocating resources and setting priorities to ensure that commitments are met on time or are revised (with appropriate approvals). When unexpected delays threaten

completion of commitments on schedule, supervisors are required to inform the responsible licensing manager, to permit timely notification to the NRC of the revised commitment dates.

The organization which is responsible for implementing an action necessary to fulfill a commitment is required to maintain an up-to-date status of the commitment on the commitment tracking data base until the item is closed out. After completion, licensing personnel will close the item in the data base upon receipt of documentation which verifies completion and thereby justifies closure. Licensing periodically issues a report to the Senior Vice President showing numbers of commitments made, completed, and closed by each organization. Included in each report is a specific comment on trends observed for each organization responsible for timely closure of commitments.

The commitment tracking systems previously used by TVA's nuclear plants and various nuclear departments have been reviewed to ensure that the commitment tracking data base includes all open/incomplete commitments made to NRC. The information in the tracking system which was previously used by licensing (which included commitments being tracked by corporate-level departments) was used as the initial source of information for the data base. The data in the commitment tracking systems used at each of TVA's nuclear plants have been reviewed to verify that the control data base completely identifies open or incomplete commitments and the corporate commitment tracking data base is currently being used for tracking applicable commitments.

The original CCTS data base is being integrated into the TROI (Tracking and Reporting of Open Items) data base to reduce duplication of tracking and retrieval functions, and to facilitate action tracking on commitment items.

With the commitment tracking function fully operational, TVA's nuclear program has a single commitment tracking system which is used by all of TVA's nuclear departments and plants. This centralized system provides assurance that TVA's commitments to the NRC are implemented in a timely manner.

TVA is further enhancing its commitment management capabilities through the development and implementation of an ILS program under the direction of the Vice President and Nuclear Technical Director. When the ILS is in place, resource planning for new commitments will include incorporation of action plans and schedules within the appropriate element of the ILS. This will improve TVA's ability to plan for and meet its commitments.

4. Conclusions

TVA has taken and will take steps to improve its nuclear management systems and controls by establishing a long-term program to develop an integrated Nuclear Procedures System to direct and/or control activities at TVA's nuclear plants; by centralizing responsibility for business planning and financial control of nuclear activities; by establishing a Special

Projects organization to provide direction, oversight, and support for all Nuclear Power projects, including implementation of an ILS program; by establishing a central management nuclear information system; and by implementing a centralized corporate commitment tracking data base. These actions help to assure that TVA's nuclear activities are controlled by corporate-level management, that the activities of each of TVA's nuclear departments are integrated, and that TVA satisfies its commitments to the NRC.

D. Improving TVA's Nuclear Corrective Action Program

During recent years, there have been occasions when TVA has identified problems in its nuclear program but has not corrected those problems in a timely manner, or has not identified and corrected the root cause of the problems in order to preclude their recurrence, or has not evaluated a problem at one nuclear plant to determine whether the same problem is applicable at another nuclear plant. This situation indicates a weakness in TVA's nuclear corrective action program and the management of that program. As is discussed below, TVA is taking several steps to improve its programs and management in this area.

1. Assuring Timely Corrective Action

TVA has a unified program of corrective action for ensuring that conditions adverse to quality (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 corrective action process includes criteria that establish a threshold that a CAQ has to meet before being documented on a Condition Adverse to Quality Report (CAQR). The corrective action program ensures that CAQRs receive timely resolution by utilizing a CAQR tracking system that identifies the group responsible, the condition, and a deadline for implementation of the resolution. CAQRs require increased management attention and more formal generic reviews, review to determine significance (i.e., reportable or represents a QA programmatic deficiency) and potential affect on plant operability, and preventive actions.

CAQs that do not meet the threshold criteria for a CAQR may be documented, corrected, and trended in one of the administrative control programs. The administrative control programs are used on a day-to-day basis to administratively control activities and work processes within each organization which may identify and correct CAQs. Reporting documents in the administrative control program include, but are not limited to, Maintenance (Work) Requests, Radiological Incident Reports, Inspection Reports, and Problem Reporting Documents (PRD). The list of documents may change with identified need and may vary from location to location.

The NQA program and procedures define those CAQs which are tracked and trended on Tracking and Reporting of Open Items (TROI). This computer program has been implemented for trending of such CAQs throughout NP. The analysis of trend data supplied by the computer program is the responsibility of line managers. Additionally, NQA identifies QA trend indicators and performs a corporate-wide QA trend analysis to support its QA assessment responsibility on an ongoing basis. The tracking systems for CAQs controlled by administrative control programs are specified in approved procedures.

2. Identification of the Root Cause of Problems

Some of the problems in TVA's nuclear activities have recurred, indicating a need for improvements in the identification of the root causes of the problems and in the development of actions to preclude recurrence of the problems. TVA has issued a Nuclear Power standard to ensure that a consistent methodology is utilized in identifying and addressing the root causes of problems. The root cause analysis program identifies specific conditions when a root cause analysis is required (i.e., significant CAQRs, Licensee Event Reports, non-significant CAQRs that are potentially generic or affect operability, and events or conditions which compromises the safety of plant personnel or the general public).

As discussed in the previous section, CAQs in nuclear activities will be tracked and their significance will be assessed. TVA

will take two steps to identify the root causes of these conditions. First, each significant CAQ will be individually analyzed to determine its root cause and to recommend action to remedy that cause. Second, each CAQ will be placed in various categories, such as the group responsible for causing the condition, the type of condition, the type of item or matter which is deficient, and if the CAQ is significant, the root cause of the condition. An analysis will be periodically performed to identify any adverse trends, and these trends will be evaluated to determine their root cause and to recommend action to remedy that cause. In both cases, management will be informed of any significant conditions adverse to quality and any adverse trends, their root causes, and the recommended action to remedy those causes. This will enable management to perform its own assessment and ensure that appropriate remedial action is implemented.

Implementation of these guidelines will provide assurance that the root causes of significant conditions adverse to quality and adverse trends will be identified. TVA will then be in a position to develop corrective action which addresses these root causes in order to preclude recurrence of the adverse condition.

3. Identification of Problems Applicable to More Than One Plant

There have been instances when problems identified at various nuclear plants throughout the country have not been accounted for at TVA's plants and when problems identified at one of TVA's

nuclear plants have not been accounted for at its other plants. TVA has taken action to address both of these concerns.

The Manager, NLRA, under the direction of the Vice President and Nuclear Technical Director, is responsible for managing the TVA Nuclear Experience Review (NER) program for internally and externally identified problems or events. Under this system, significant problems or events identified at other nuclear plants by the NRC, INPO, NSSS vendors, and others, and significant problems (events) identified at TVA's nuclear plants are the subject of experience review reports.

Operating experience information (internal and external to TVA) is screened to determine applicability to TVA. If it is determined that the problem is applicable to TVA, then an analysis is performed to develop corrective action recommendations or positions to be provided to sites, engineering, and training personnel to take immediate corrective action if necessary.

A corporate nuclear experience data base has been developed to interface with all facets of the TVA nuclear organization. This data base will provide TVA-wide access and provide the necessary management tool to track all experience review items. A feedback mechanism has been established to ensure that the completed nuclear experience review recommendations are factored into the programs of operations, design, construction, and training.

TVA recently completed an independent review of the NER program in order to assess the effectiveness of the organization, and the procedure used to evaluate and benefit from internal and external experience. Based on the recommendations made by the independent review team, TVA has taken actions to strengthen the NER organization and is in the process of revising procedures, enhancing the NER data base, training personnel, and developing a computer based equipment listing to aid in the location of equipment components effected by NER reports.

The enhanced NER program will better ensure that significant problems identified at other nuclear plants in the country and at one TVA nuclear plant will be evaluated for applicability to TVA's other plants. This system will also provide a means for developing remedial or preventive action for those problems which are determined to be applicable to TVA's nuclear plants.

E. Programmatic Improvements

TVA is making improvements in various programmatic areas of its nuclear program. The improvements in each area are discussed in general below. Plant-specific improvements in TVA's nuclear program will be discussed in the Nuclear Performance Plans for each site.

1. Improvements in Operations

TVA has experienced problems associated with its nuclear operations and maintenance. Many of these problems involved inadequate procedures, failure to comply with procedures, weak operator training, and failure to identify the root causes of problems. As is discussed below, TVA is taking steps to address each of these areas.

a. As discussed in Section VI.C.1 above, TVA is conducting reviews of its nuclear procedures. These reviews will emphasize upgrading of TVA s nuclear operation, maintenance, and surveillance procedures to correct documented deficiencies, incorporate organizational changes, and reflect plant modifications. In particular, these reviews will focus on the technical content and clarity of TVA's nuclear operation and surveillance procedures. TVA's long-term procedures upgrade program will assure that recent industry and NRC concerns, such as human-factors considerations, are properly accounted for in the procedures.

TVA's nuclear management has placed increased emphasis on procedure compliance and will monitor for noncompliance. For example, supervisors who are responsible for work activities will be required to ensure that proper procedures are identified to control the activities and that personnel performing the work are required to follow the procedure or

obtain an approved temporary change to the procedures. Additionally, the nuclear headquarters staff and the site QA manager has been directed to monitor for compliance with procedures when conducting their plant performance assessment activities. Finally, TVA's nuclear procedures specify progressive disciplinary action to be imposed for failure to follow procedures.

b. TVA has taken and is taking steps to improve its nuclear operator training. As discussed in Section IV.E.3, TVA has consolidated responsibility for nuclear training activities under the Vice President, Nuclear Assurance and Services. Additionally, TVA has made plant-specific improvements in operator training. TVA continues to aggressively pursue INPO accreditation for nuclear power training programs eligible for accreditation.

Currently, all eleven programs at SQN, all eleven programs at BFN, and five at WBN are fully accredited, leaving six at WBN to be accredited. With eleven accredited programs at both SQN and BFN, TVA has earned full membership in the National Academy for Nuclear Training.

The remaining WBN programs (the four Operator Training Programs, the STA Training Program, and the Technical Staff and Managers Training Program) will be submitted for accreditation prior to loading fuel in WBN unit 1.

c. Finally, TVA is taking other steps to identify problems and improve its nuclear operation and maintenance activities. These steps include the following:

- The Nuclear Power headquarters organizations 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 assist management with the development of TVA policy, goals, and objectives for operation and maintenance activities. They also monitor implementation of policy through onsite assessments of plant programs and observation of work activities, and assess site performance through review of performance data.

- An expanded corporate nuclear performance reporting system has been developed. This system provides for the collection of key performance indicators for trending and analysis by the appropriate nuclear headquarters technical staff.

- TVA is implementing a system engineer program at each nuclear site. The system engineers are responsible for monitoring system performance and ensuring feedback into preventive maintenance programs, ensuring in-depth analysis and corrective action for system problems.

- As required to expedite work and focus resources, TVA established task forces. The individuals performing these functions were selected from throughout the nuclear industry because of their breadth of experience and are on loan from their parent companies. Task forces at each site, except Bellefonte Nuclear Plant, were established and charged with the responsibility to verify the identification of problems, prioritize and evaluate performances of ongoing activities and initiate actions for resolution of known problems where necessary. The task forces for Sequoyah and Browns Ferry restart completed their respective tasks and have been disestablished. The task force at Watts Bar has also been disestablished but the objectives of this task force are now encompassed by the Watts Bar Program Team primarily made up of senior TVA personnel. This program team has the responsibility for developing an overall plan for completing both units at Watts Bar. This includes recommending guidelines for determining acceptability of work; determining requirements for reinspection and rework; and directing the evaluation of safety significance of any discovered deficiencies.

The establishment of these task forces did not relieve line management and, in particular, the Site Directors of their assigned responsibilities.

d. In sum, TVA is reviewing and upgrading its nuclear operation, maintenance, and surveillance procedures, has placed increased emphasis on compliance with nuclear procedures, and has taken steps to identify any developing problems in nuclear operations. These actions should help improve the safety of operation of TVA's nuclear plants.

2. Improvements in Maintenance

In recent years, TVA's nuclear plants have experienced problems in the area of nuclear maintenance. In April of 1986, the Nuclear Manager's Review Group (NMRG) was requested to conduct a comprehensive review of corrective and preventive maintenance at Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants. Review results have been reported and corrective action responsibilities have been assigned. Corrective action plans are underway.

As recommended by the NMRG, a corporate nuclear maintenance organization has been established which reports to the Vice President, Nuclear Power Production. This organization is responsible for developing improved maintenance programs and policies for implementation at all TVA nuclear plants. Good elements of current maintenance programs will be used to the extent practicable, but modifications will be made as necessary to achieve improved programs that can be implemented uniformly at all nuclear sites. In general, differences in the programs not associated with hardware configuration will be minimized.

Two steps taken toward accomplishing this have been the issuance of Nuclear Power Directive 10.3, Plant Maintenance, and Nuclear Power Standard 4.4.7, Administration of Site Instructions, Attachment 2, Writers Guide for Maintenance Organization Instructions. Training of the writers of maintenance instructions is underway. Knowledgeable maintenance personnel from all nuclear sites will contribute to these maintenance improvement efforts under the guidance and direction of the corporate nuclear Operations and Maintenance Support organization. Though each nuclear site will remain responsible for planning, scheduling, and executing its own maintenance, the corporate nuclear maintenance organization staff will be responsible for regular assessment of the effectiveness of site maintenance and for assisting site maintenance personnel with needed improvements. The corporate maintenance organization reports to the Manager, Operations and Maintenance Support who in turn reports to the Vice President, Nuclear Power Production. Results of the corporate nuclear maintenance staff's efforts will be reported regularly to the Vice President Nuclear Power Production and the Senior Vice President. Significant improvements are planned in the following maintenance areas.

First, improvements are being implemented in nuclear site preventive maintenance. These improvements emphasize reducing recurring corrective maintenance, improving use of predictive maintenance, and adherence to established preventive maintenance routines. Analysis of equipment performance history and

maintenance history, including reliability and availability information from NPRDS and TVA sources, are being used, together with vendor recommendations, to develop optimum preventive maintenance routines. Common routines will be used at all sites, except for differences made necessary by the hardware configuration.

Second, the planning and scheduling process for nuclear maintenance activities has been upgraded. 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 and documented prior to closeout of the activity. This process will incorporate procedures to be used, identification of equipment needed, quality assurance requirements, and post-maintenance testing requirements. Where appropriate, checklists will be used to ensure that all applicable requirements are adequately addressed and that coordination with other organizations is performed as appropriate.

Additionally, training of nuclear maintenance personnel is being upgraded at all sites. The instrument technician, electrical and mechanical maintenance training programs at Sequoyah, Browns Ferry and Watts Bar have been accredited by INPO.

This is a long-term program which, when fully implemented, will result in a system where maintenance activities that require specialized skills will be identified and only those personnel evaluated as possessing the requisite skills will be assigned responsibility for performing the work.

In addition to the craft training discussed above, maintenance engineering and planning and scheduling personnel will be better trained in execution of their responsibilities. Enhanced training for these personnel will be developed and implemented as improvements in the planning and scheduling process are made; priority will be placed on activities that have the potential to impact the adequacy of safety-related activities. These include selection of proper safety classifications for maintenance work and identification of proper post-maintenance testing.

In sum, TVA has established a corporate nuclear maintenance organization to centralize oversight of maintenance and has placed increased emphasis on adherence to approved procedures. Further, TVA has taken steps to upgrade its nuclear maintenance and surveillance procedures. These actions should contribute to safer operation of TVA's nuclear plants.

3. Improvements in Welding

Approximately 400 welding concerns were identified through the Employee Concerns Special Program at Watts Bar Nuclear Plant.

These concerns indicated a need for investigation of the adequacy of TVA's overall nuclear welding program.

As is discussed in detail in TVA's letter to the NRC dated January 17, 1986 (Ref. 6), TVA formed a Welding Project to perform such an investigation. The Welding Project was composed of managers and senior engineers from Nuclear Engineering, Nuclear Construction, Nuclear Quality Assurance and representatives of nuclear corporate staff. Consultants and outside contractors were also used to provide certain expertise and perform independent evaluations.

The Welding Project utilized a two-phase approach to examine welding programs at all TVA nuclear plants. The objectives of Phase I were to ensure that TVA welding requirements and specifications were correctly reflected in the program for each plant and to identify and categorize concerns/deficiencies in each program. These objectives were accomplished by (1) reviewing TVA commitments to NRC and verifying that TVA's welding programs reflect these commitments, and (2) assembling, identifying, and categorizing various indicators of the quality of welding (including employee concerns), and analyzing these indicators to determine their implications with respect to the adequacy of TVA's nuclear welding program. Following this analysis, the Welding Project determined the adequacy of the nuclear welding program to control welding and identified any deficiencies in the program and proposed corrective actions or improvements.

The purpose of Phase II for each plant was to evaluate the adequacy of implementation of TVA's nuclear welding procedures, verify that the installed weldments meet requirements or are adequate for service, correct identified welding deficiencies, and implement changes to prevent recurrence of these deficiencies. This purpose was accomplished by performing independent audits of nuclear welding program implementation. Additionally, the Welding Project evaluated the need for reinspection of welds based upon the results of the independent audits and the analyses of the quality indicators in Phase I.

Following this evaluation, reinspections of welds were performed as warranted. Any deficiencies identified as a result of the independent audits and reinspections were subject to appropriate corrective action.

The evaluations in Phases I and II were documented and submitted in separate reports. These evaluations enabled TVA to determine that the nuclear welding program and the safety-related welds are adequate to support operation of the plants. Once the plants are operational, TVA will continue to rely on the QA/QC program and inservice inspections to assure that a high quality welding program is being maintained.

TVA has initiated appropriate changes to programs as the changes were identified by the welding projects at each site.

4. Improvements in the Control of Design Changes and Plant Modifications

TVA's nuclear plants have experienced problems in the area of controlling design changes and plant modifications. TVA has made several improvements in this area. These improvements are described below.

As discussed in Section IV.E.2, engineering and design activities performed for TVA's nuclear power plants, both under construction and in operation, are performed under the centralized control of Nuclear Engineering (NE). Each site is supported by an engineering project team headed by a project engineer responsible for all engineering onsite.

Among other things, the project team assures that design changes are reviewed and approved by engineering personnel for compliance with technical specifications and other regulatory requirements and commitments.

Additionally, responsibility for the accuracy, adequacy and content of all drawings and technical documents has been assigned to Nuclear Engineering. Engineering will validate the as-constructed drawings and control changes to them as modifications are approved and made in the plant configuration. By placing this responsibility within one organization, TVA will help assure that design changes and nuclear plant modifications

receive appropriate engineering review and approval and that drawings and other technical documents accurately reflect the actual plant configuration.

NE is responsible for all engineering and design functions. It is NE's responsibility to control the technical and administrative requirements for engineering activities. Technical direction at all sites will emanate from one source, the responsible technical department.

A demonstration of how centralized responsibility can eliminate previous design control problems can be seen in respect to problems with "as-built" drawings. Previously, there were two sets of drawings applicable to plant systems, the "as-designed' drawing which represented engineering's efforts and the "as-constructed" drawing which represented construction/ modification effort. With dual engineering responsibility, the two drawings were not always reconciled when the work was complete. With centralized responsibility, NE has sole responsibility for the engineering integrity and accuracy of drawings. This results in one set of drawings accurately reflecting the plant configuration and being reconciled with engineering requirements through a controlled design process.

For plant modifications, the centralization of engineering responsibility improves the accuracy of plant documentation by utilizing consolidated plant modification packages.

F. Continuing Evaluations

TVA has evaluated the various elements of its nuclear program and has identified fundamental problems. The short- and long-term improvements being made in its nuclear management systems and programs are described herein. These improvements are being incorporated into the Nuclear Power Policies and Directives which will define plans, programs, and procedures needed for implementation. As Nuclear Power proceeds with the implementation phase of the Nuclear Performance Plan, further improvements to these programs may be identified. It is expected that the NMRG reviews, onsite assessments by Nuclear Power headquarters organizations, and third party audits such as the annual INPO corporate audit conducted at the request of the TVA Board, will provide a measure of the effectiveness of TVA's programs and guide evaluations for possible future improvements. TVA continues its practice of making these assessment reports available to NRC.