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Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP) ASSESSMENT PERIOD PERFORMANCE

The purpose of this letter is to provide information for NRC's consideration in reviewing BFN's performance for the current SALP report period of January 1, 1989 to March 31, 1990.

The most recent NRC SALP evaluation for the performance of BFN Units 1, 2, and 3 was issued September 17, 1985, for the 15-month period between March 1, 1984 and May 31, 1985. That NRC SALP report indicated significant weaknesses in many aspects of BFN's nuclear activities. Since receiving the September 1985 SALP report, TVA has initiated extensive corrective action to improve performance at BFN in all functional areas.

In general, TVA believes that corrective actions which resulted in many positive individual changes and programmatic upgrades that have substantially improved nuclear performance and operational readiness at BFN. TVA's progress in this regard is evidenced by the working atmosphere now exhibited and promoted by the new site management team. The primary responsibility of this new management team is to provide leadership and direction that stresses individual accountability, attention to detail, and procedural compliance. TVA considers these factors to be critical to the readiness of Unit 2 to resume power operations.

While TVA considers that it has implemented many effective actions to address identified problems and that it has taken steps to improve performance so that BFN can resume power operations, TVA knows and understands that improvements are still needed in many areas in order to make BFN a top performing plant. TVA believes the following to be the most significant areas for continued improvement: reduction in personnel errors, procedural adherence, maintenance performance (e.g., planning and scheduling, backlog reduction, communications, and parts availability), and operator experience level. To improve performance in these and other areas, TVA has put in place, both at the corporate and plant level, a management team that is committed to achieving improved performance. To this end, TVA is focusing on identifying and understanding the root causes of these and other weaknesses and unresolved problem areas.

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With regard to tangible results achieved to date, the enclosure to this letter presents information pertaining to each of the SALP functional areas. In each functional area we have specifically highlighted some of the more significant accomplishments achieved during the assessment period. Overall we believe that all of these accomplishments are clear indicators of significant progress made at BFN.

Please note that the functional area of Plant Operations is not addressed in the enclosure. TVA considers that an evaluation in this functional area would not be appropriate because all three BFN units have been shut down for nearly five years. We suggest that BFN instead be rated in the functional area of Shutdown Operations. This alternate functional area is discussed in the enclosure.

TVA is proud of the steady progress evidenced at BFN over the past fifteen months and believes that this progress has significantly improved TVA's capability to operate BFN safely and efficiently. However, as noted earlier, TVA recognizes that many challenges still lie ahead in the startup and operation of BFN and that further improvement is essential. Management attention will be closely focused in the upcoming assessment period to ensure that these goals are attained.

TVA looks forward to receipt of the NRC's SALP evaluation for BFN.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

Oliver D. Kingsley, Jr.
Senior Vice President,
Nuclear Power

Enclosure
cc: See page 2

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MAY 09 1990

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP)

January 1, 1989 - March 31, 1990

ASSESSMENT PERIOD PERFORMANCE

I. SHUTDOWN OPERATIONS

This functional area applies to plants such as BFN that are in extended shutdown, in lieu of the plant operations functional area. The area consists chiefly of the control and performance of activities directly related to maintaining the plant in the shutdown mode. It also includes an assessment of operational readiness. Within these parameters, the areas discussed include management direction, control and monitoring; maintaining the status of plant conditions; control and validation of system lineups; and control room professionalism. Plant housekeeping, equipment conditions, fire protection, and interfacing activities that support plant operations are also included.

In order to establish effective shutdown operations and prepare for future power operations, TVA instituted significant changes during the assessment period and began to see the results of previous and ongoing upgrades. Of specific importance, TVA sought to strengthen Operations management expertise, and bring in new management perspectives at BFN. To this end, three new Unit Operations managers were hired. All of the individuals filling these positions have held SRO licenses. These managers have considerable experience in operations, operations restart and operations training; procedures; and planning and scheduling. These managers were tasked with, among other things, upgrading operator training, enhancing procedures and improving nonlicensed operator performance.

To enhance management involvement in day-to-day operations, Operations management reporting to the Operations Superintendent was expanded from four to six managers. This reorganization decreased individual responsibilities and spans of control and increased operations expertise as discussed above. This upgrade was also intended to provide these managers with the time necessary to be involved in day-to-day problems and the time to allow the managers to get ahead of potential problems. In addition, to improve day-to-day oversight, a management observation checklist was established for periodic observations of plant activities by onshift and offshift managers. Taken together, these management-level changes were intended to, and have, significantly improved performance in all aspects of this functional area and substantially increased operational readiness.

TVA also instituted improvements that affect many of the specific plant activities to be assessed under this functional area. For example, in response to a TVA Quality Assurance (QA) and NRC recommendation, TVA upgraded and proceduralized its prior section instruction letter on system status control. The new system status control procedure incorporates additional management reviews of configuration changes and improves the documentation and recordkeeping requirements for these changes. Subsequent reviews by the NRC and by QA have identified few problems with system status control.

Performance with respect to many aspects of this functional area is also directly affected by the quality of training. Accordingly, during this assessment period TVA has taken many measures to enhance training for

Operations personnel--with the goal of improving the conduct of daily operational activities. For example, requalification training for licensed and nonlicensed personnel was previously expanded from four to eight weeks, enhancing performance during the assessment period. Auxiliary Unit Operator (AUO) training and performance has also been enhanced by assigning a Training AUO to each shift. In addition, prior to restart the Shift Operations Supervisors (SOS) will have participated in INPO peer evaluations at other utilities. This will provide these individuals with an opportunity to observe and learn how operational activities are conducted at other plants. Finally, and perhaps most significantly, operator performance during recent requalification examinations (100-percent pass rate) is a graphic demonstration of the operators' readiness to restart.

Another aspect of this functional area is the overall effectiveness of the Operations organization and its ability to interface with other relevant site organizations. TVA has taken several specific measures to improve interfacing activities. One significant organizational change instituted during the assessment period involved the integration of Operations, Work Control, and Chemistry. Following this change, TVA expects to see dramatically improved work control performance.

The responsibility for fire protection was also integrated into the Operations organization and the onduty fire brigade now reports directly to the SOS. This change enhances the fire protection program in several respects. First, the SOS has ownership of the program, leading to improved performance in the area. Second, this change should improve TVA's ability to control fire protection compensatory measures (an area that has been a weakness). Finally, integration of the program into Operations should enhance communications and interactions between fire protection personnel and Operations personnel. This should enhance overall performance under the program.

During this assessment period TVA also initiated programs to eliminate long-standing problems with violations of procedures and technical specification (TS) requirements. Specifically, as one part of this effort TVA implemented a major program to rewrite and verify Operating, General Operating, and Abnormal Operating Instructions (OI, GOI, and AOI, respectively). This involved three steps with the overall objective of improving procedure accuracy, broadening procedure scope, and upgrading the human factors characteristics of procedures.

The first step was the actual rewrite of the procedures. TVA began to accomplish this step prior to 1989 with procedure writers who had operating experience. TVA continued the rewriting effort in 1989, utilizing plant operational personnel with procedure writing experience. One emphasis of the rewriting effort was on including bases information in the cautionary notes to the procedures, in order to enhance the understanding of the procedures when they are applied in the future. The procedures were also rewritten in accordance with established writers' guides.

The second step of the procedure rewrite effort was a management review. The review was conducted by a blend of the new managers discussed previously and preexisting managers with experience at TVA. This allowed the new managers to apply their perspectives from outside TVA, while also allowing longstanding TVA managers familiar with BFN to apply their experience. As a third stage of the procedure rewrite effort, selected revised procedures were also exercised on the plant simulator to obtain operator feedback and to obtain experience with the procedure. In addition, the revised procedures have been used in the restart test program. It can also be noted that very recently TVA began to require review of all operations procedure changes by Training personnel. This facilitates training of Operations personnel on procedure changes, and also provides an objective review on these changes.

In conjunction with the procedure rewrite effort described above, TVA also improved several TSs which were unclear or poorly written. In an effort to minimize future misinterpretation or liberal interpretation of TSs, numerous changes were made. For example, ten TS change requests were submitted. In each case the General Electric Standard Technical Specifications (NUREG-0123) were used as a model to provide more clearly written and implementable TSs. Another example was the review of TS interpretations by Operations, Technical Support, Nuclear Engineering, and Licensing, and the subsequent cancellation of most of these interpretations. The remaining interpretations are supported by safety evaluations. These revisions were incorporated into the operations procedure rewrite and review process. Finally, it should be noted that TVA is also incorporating Emergency Operating Instructions into a similar revision/review process. This effort has begun.

Also, relevant to TVA's objective of eliminating TS violations, a formalized program to track limiting conditions for operations (LCOs) was implemented. The tracking program is intended to ensure that all LCOs are documented and, accordingly, to minimize LCO violations. LCO tracking is now computerized and is controlled by the SOS and Shift Technical Advisor in the main control room.

Another important aspect of the shutdown operations functional area is control room performance and professionalism. TVA has also made improvements in this area at BFN. For example, to improve senior reactor operator command and control of unit activities, the SOS was relocated into the main control room area. TVA also created a Shift Support Supervisor position to reduce the administrative burden on the SOS. These changes resulted in increased involvement of the SOS in daily operational activities. Other changes, made in response to human factors concerns, involved extensive relabeling of Unit 2 and common control panels by a labeling group tasked with upgrading Units 1, 2, and 3 plant labels in the future. This group also completed labeling of instrument racks containing reactor protection system or primary containment isolation system instruments. An additional control room improvement was the development and implementation of an annunciator tracking program to enhance operator cognizance of control room alarm conditions during the plant's extended shutdown.

The management and operational changes discussed previously helped to promote a philosophy at BFN emphasizing operational readiness. This is the most important improvement in this functional area. TVA's operational philosophy stresses the development and acceptance of plant ownership by its operators. It also emphasizes teamwork and communication among plant operators, the importance of maintaining cognizance of plant status, and the importance of following principles of good operation. One indicator of operational readiness at BFN is the decreasing incidence of personnel errors and procedural noncompliances. The operators recognize that continued development of an improved understanding of procedural compliance is still necessary. For example, the number of engineered safe feature actuations attributed to operator error has been reduced significantly over the past year. Only one occurred in 1989. While this represents a marked improvement, TVA considers that solutions to human performance issues require long-term attention and oversight. Accordingly, TVA will remain vigilant for adverse indicators. In addition, expanded TS training is being conducted during annual requalification training that stresses the need for personnel to continue to question activities, procedures, and interpretations to ensure that both the explicit requirements and the intent of TS are being satisfied.

Another indicator of establishment of an ownership philosophy at BFN is the quality of plant housekeeping, which we believe continues to be excellent at BFN. TVA has plans in place to reclean and repaint equipment as modifications are completed. In addition, for Unit 2, TVA is painting floors and walls, upgrading identification and color coding of system components and flow paths, and has removed asbestos insulation where necessary.

In summary, while weaknesses versus TVA goals still exist in the areas of personnel error and procedural adherence, significant progress has been made in this functional area during the assessment period. Additional operational expertise was brought into the Operations organization and significant progress was made in the area of compliance with procedures and TS requirements. All of the measures taken in this area help to promote a philosophy stressing operational readiness and a commitment to excellence at BFN.

II. RADIOLOGICAL CONTROLS

This functional area involves activities such as maintaining radiation dose as low as reasonably achievable (ALARA) and occupational radiation protection programs, radioactive waste management, and radiological effluent control. Other related activities include radiological surveys, contamination control, radiation monitoring, radioactive material control, and hot particle programs.

TVA is continuing to improve performance in this functional area. For example, TVA has made several specific improvements in the area of ALARA implementation. These include the performance of prejob planning for any job expected to accumulate greater than one man-rem. Another effort to reduce exposure involves the use of improved remote monitoring and communications equipment. An additional improvement involved the design and implementation of two shielded enclosures to minimize radiation exposure to Nuclear Security personnel. These enclosures provide a shielded controlled environment for

security personnel stationed on a continual basis at the vital area access points in the Unit 2 drywell. One of the enclosures was put into service immediately following the end of this assessment period. Use of the enclosures is expected to save seven man-rem per year.

TVA also obtained an under-vessel mock-up to train personnel on control rod drive seismic restraint installation. In addition to this specific task, the mock-up can also be used to train personnel on under-vessel activities. This training practice allows the workers to familiarize themselves with specific jobs, which results in less time spent performing the tasks and therefore less dose received. These changes along with ALARA awareness training discussed below should assist in reducing the total station exposure.

To control and decrease solid and liquid radwaste volume, several new initiatives and equipment improvements have been instituted. The use of reusable items such as new contamination zone booties and tool bags has been initiated. Reusable metal scaffolding is being purchased and the program for replacement of wood scaffolding material is ongoing. Toolroom control of reused items, including hoses, welding leads, and light cords has been and continues to be expanded, which will force these items to be returned to a place where they can be reused rather than discarded. Radwaste filter processing efficiency was also increased by 80 percent during the assessment period.

A radwaste volume reduction program is also in place to help further reduce the generation of radwaste. Some of the reduction methods include the use of a bulk material permit to prevent unnecessary materials from entering the radiological control area (RCA) and the utilization of washable mop heads for area decontamination. A reduction in liquid radwaste generation was accomplished through a 36-percent reduction in leakage into radwaste systems. This change helped reduce releases to the river to 39 percent of the 1988 average.

RADCON field operations have been improved by the implementation of onsite monitoring that addresses areas external to RCAs. This action was initiated to provide assurance that contaminated material is not being released to uncontrolled areas. Strict controls over establishment of radioactive material storage areas in the plant have been implemented to require RADCON management approval of each storage area. Solid plastic barriers approximately 18 inches tall are being made part of contamination zone boundaries to provide an external barrier to the movement of contamination. The use of containments (glove boxes and work tents) was implemented and a procedure written to control their use. Other changes include development of a standardized radiological posting procedure, increased management attention in field observations, and implementation by procedure of control and DOP testing of portable HEPAs and vacuum cleaners. In addition, control of high radiation areas has been enhanced by strengthening the control of keys to high radiation areas and proceduralizing general guidelines to meet TS requirements in a consistent manner.

Although not specifically listed in the description of this functional area, another important aspect of performance in the area is training activities. Training efforts can result in overall performance gains with respect to many of the specific program elements. With respect to RADCON training at BFN, RADCON shift supervisors and engineering staff are now being qualified as INPO-certified instructors. This allows more onshift training to be performed. Compared with past training, the number of hours devoted to training each technician is expected to triple.

Additionally, RADCON level II general employee training at BFN now includes dressout training practice where employees are observed donning and removing protective clothing during simulated work in a contaminated area. The development of ALARA Awareness Training (AAT) for nuclear plant workers (crafts) was completed; the first class was taught on November 6, 1989. Six training modules were developed that allow a low student to instructor ratio, thereby facilitating more individualized instruction. The modules cover topics on radiation work permits, exposure control, radiological survey map reading, decontamination, contamination control, and contamination containment construction/utilization. The course is 16 hours in length and makes extensive use of a mock-up facility. The mock-up facility was constructed to simulate a realistic plant environment with radiological anomalies and conditions. Initial observations indicate that there are significant improvements in the knowledge level of workers who have received AAT.

With respect to this functional area, TVA believes several selfassessments and external reviews have enabled it to identify further enhancements and corrective actions. Specifically, as part of a selfassessment/performance improvement effort initiated during this assessment period, TVA reviewed NRC violations related to RADCON since 1979 for programmatic deficiencies. This review identified that over 60 percent of these violations were in three areas: (1) control of high radiation areas, (2) improper use of protective clothing, and (3) improper posting of areas and containers. As a result of this selfassessment, many specific corrective actions, such as the new radiological posting procedure and the control of high radiation areas, were implemented by RADCON to eliminate deficiencies and reduce the likelihood of future similar violations.

In the past two years there have also been several other important assessments of TVA's performance in this functional area. Specifically, there were inspections by INPO, NRC, TVA's Operational Readiness Review (ORR) team; the National Voluntary Laboratory Accreditation Program, and TVA's Corporate Nuclear Quality Assurance organization. No programmatic weaknesses were identified during these reviews. Selfassessments performed in preparation for INPO and ORR team inspections also did not identify any weaknesses.

In the past, there was a concern that RADCON relied too heavily on contract technicians. In response to this concern, BFN management made a concerted effort which continues to the present to eliminate this over reliance. Today, all members of site RADCON are TVA employees.

To address NRC and industry concerns involving hot particles and exposures to pregnant females, TVA strengthened its programs during the assessment period. The hot particle program which was implemented in mid-1988 was further enhanced with stricter controls and new information developed in the industry. Regarding pregnant females, TVA instituted stronger administrative controls for prenatal care. These included counseling following identification of pregnancy; relocation, upon consent of the employee, to a different work station outside the RCA; and the establishment of a monthly exposure limit.

In summary, TVA's performance in this functional area has continued to be good, and a number of changes were implemented to further improve performance. Training for RADCON personnel has been increased; actions to improve ALARA awareness, and to decrease radwaste volume, have been implemented; and RADCON field operations have been strengthened through several ongoing selfassessment/improvement programs. In addition, the April 1989 INPO evaluation awarded BFN a good practice for the use of mobile air compressors to supply breathing air for radiological workers.

III. MAINTENANCE/SURVEILLANCE

This functional area includes activities related to diagnostic, predictive, preventive, and corrective maintenance of plant structures, systems, and components. Also addressed in this functional area are activities related to procurement, control and storage of components, qualification controls, installation of plant modifications and maintenance of the plant physical condition. Conduct of surveillance testing activities as well as inservice inspection and testing activities are also covered by this functional area.

A. Maintenance

During the evaluation period numerous actions were taken in the Maintenance department intended to address weaknesses such as planning and scheduling, maintenance backlog, communications, parts availability, and to improve and maintain the overall quality of performance in this functional area. One of the principle actions potentially affecting all aspects of the area as listed above, was the establishment of an aggressive, stable, and more qualified management team. This team now consists of a Maintenance Superintendent; a Maintenance Production Manager and a Maintenance Planning and Technical Manager, both new positions created to strengthen supervision; and additional general foremen.

The Maintenance Superintendent position was filled with a TVA employee who has considerable management experience, while the new positions were filled with outside candidates experienced in their respective areas. Seven general foremen, the first level of management in the Maintenance organization, were added to the Maintenance staff to provide better direct supervisory control. Six of these foremen were hired from outside of TVA, and were selected based on their management skills and performance records

at other nuclear facilities. These individuals have been aggressive at implementing plant policy and accomplishing maintenance work safely and in accordance with requirements. The new management team has achieved success through higher standards, strict accountability and emphasizing safety and quality before productivity.

An example of this management team's aggressive pursuit of improvement during this assessment period is the significant reduction in the number of open items related to maintenance, and in the number of maintenance-related personnel errors and personal injuries. Specifically, open Conditions Adverse to Quality Reports were reduced by over 95-percent, and only three remained open at the end of the assessment period. Additionally, over 95 percent of the improvement actions from the Maintenance Improvement Program were completed. In the course of the assessment period, outstanding Unit 2 startup maintenance requests were reduced by over 50 percent. Preventive Maintenance (PM) backlog items were also reduced by over 95 percent, and late PMs now comprise less than one percent of the total PMs. The most significant reduction may be in personnel errors, which decreased from an average of six per month in the first half of 1989 to only one since September 1, 1989. Regarding personal injuries, Maintenance is currently approaching one million man-hours without a lost time accident.

Management commitment and involvement in the continued improvement of the maintenance process is also evident by the expansion and refinement of maintenance training to better suit the plant's needs. Two training coordinators were added to coordinate classes and schedule attendance. These individuals also ensure that training requirements are met on a continuing basis. Also, a continuous training program was implemented in Maintenance to train personnel on procedure changes and activities that affect maintenance, and also to inform them of significant industry events. Other specific maintenance training was also conducted in the areas of environmental qualification, work control, post maintenance testing, and the maintenance improvement program. Several maintenance supervisors and engineers were also trained in Kepner-Tregoe, a problem-solving and decisionmaking course.

Regarding the various elements of the maintenance portion of this functional area, TVA considers several accomplishments to be noteworthy. First, TVA at BFN has been aggressive at implementing diagnostic and predictive monitoring to improve the reliability of plant equipment. TVA specifically utilized a preventive maintenance failure trending analysis and, as a result, numerous ventilation fan motors were added to the PM program and are now periodically monitored for excessive vibrations. Switchyard breakers and transformers are periodically checked with infrared instruments to detect "hot spots" that could lead to serious problems. The use of eddy current testing has been expanded to include the residual heat removal heat exchangers and fuel pool cooling heat exchangers. Oil sampling and analysis is now done on large motors and

transformers, turbines, recirculation motor generator sets, and the diesel generator motors. Additionally, nondestructive examinations (NDE) have been expanded well beyond those required to satisfy ASME Section XI requirements. For example, repair procedures for several major pieces of plant equipment, including the high pressure coolant injection turbine and reactor core isolation cooling turbine, now specify NDE on subcomponent parts such as couplings.

The PM program was also emphasized and broadened during the assessment period. One indication of the increase in effort being expended on preventive measures is the ratio of preventive maintenance to total plant maintenance. This ratio is currently 82 percent, up from a previous 40-percent in January 1989. As an example of the broadening of the PM program, equipment such as motor filter screens and latching relays are now included in the program. More PM testing is now done on breakers, while more breakers have been added to the PM program. As another example, in response to a General Electric Co. Service Instruction Letter, SIL 484, TVA reassessed current PM requirements for Class 1E motors against GE's recommendations and concluded that TVA's program fully meets GE's recommended maintenance practice.

Overall plant physical conditions are considered to be good at BFN. A major facility and equipment coating effort has enhanced housekeeping and is providing additional equipment protection. Management and supervisors routinely "walk their spaces" to identify deteriorating plant conditions or equipment condition problems. Systematic walkdowns are also made periodically by the system engineers. An effective plant layup progra is also contributing significantly to improving overall plant conditions.

Also important with respect to physical conditions, a large amount of major plant equipment has been completely rebuilt or upgraded during the extended outage. Examples include main turbine overhaul, circulating cooling water pump, and fuel pool cooling pump rebuilds. TVA has excellent shop facilities on site to quickly effect repairs and if required, TVA has complete shop capabilities at nearby Muscle Shoals, Alabama to refurbish electric motors of all sizes and perform other major maintenance activities. It is noteworthy that the NRC reported in their March 26, 1990 report on the team maintenance inspection that, "the team noted generally above average housekeeping and equipment condition."

Several measures have also been implemented to reduce TS violations resulting from maintenance activities. One of these measures was the development and implementation of the "Return to Service Punchlist" (RTS) for TS components. The RTS is intended to ensure closure of work activities prior to declaring a system operable. The RTS identifies each activity, the responsible section, the required testing, and status. The RTS is updated daily by the System Evaluators and utilized for verification by the SOS and Shift Technical Advisor in returning a system/component to service. Another measure

involved reviewing and upgrading Unit 2 and common Surveillance Instructions (SIs) to verify the SIs were technically correct and acceptance criteria were clearly met, to verify the SIs were workable, and to ensure that TS requirements were fully met in the SIs.

An example of innovation in this functional area involved the application of probabilistic risk assessment (PRA) to the maintenance process. The methodology, originally adopted prior to 1989, continued to be successfully utilized during this assessment period. NRC recently commented in a meeting that BFN's application of PRA to maintenance was one of the best it has seen in the industry, and also identified this as a significant strength in the maintenance team inspection report. This methodology was developed to prioritize maintenance requests to focus on critical components. Based on a review of the BFN PRA, equipment or components whose operability is required during the recovery phase of an accident or whose failure is a significant contributor to risk were identified as critical components. This focused effort minimizes the probability of damage to, or failure of, the critical components and also increases their reliability, availability, and useful life.

In summary, while some weaknesses still exist, substantial progress has been made in the maintenance area. Maintenance backlogs have been dramatically reduced and preventive maintenance significantly increased. TVA's considerable progress in this area was reflected in the results of the recent indepth NRC team inspection of the BFN maintenance program and the program implementation. The NRC concluded that, apart from the fact that the plant was not operating, the maintenance program and its implementation are satisfactory.

B. Surveillance

TVA recognizes that, until the last few months of the assessment period, the surveillance testing program at BFN was plagued by procedure-related events. However, to address these problems, and to respond to a recent enforcement action, management has initiated a broad range of corrective actions. These corrective actions include, among others, steps to improve personnel accountability and adherence to surveillance test program requirements.

First, management implemented a validation/verification (V/V) process to ensure the technical adequacy of test procedures. This V/V process combined BFN reviews and industry good practice into one comprehensive checklist. This process also added a validation checklist to be applied after a procedure is approved, during the first use of the procedure on the simulator or during a walkdown. This validation process reinforces user involvement, improves quality by validating actual man-machine procedure use, identifies field type problems, and promotes teamwork between users and technical groups.

Programmatic issues were also addressed by improving the programs and procedures governing the implementation and control of procedures and work at BFN. These improvements included a restriction on the use of nonintent changes and a revision to the procedure governing procedure reviews to now require preapproval walkdowns and walkdowns by the cognizant/system engineer with the procedure implementor. The procedure for the incident investigation process was also significantly strengthened to ensure thorough reviews of events to determine correct root causes. Improvements were also made in the areas of surveillance scheduling, utilization of INPO's HPES program, equipment removal and return to service, and the conduct of surveillance procedure.

To ensure implementation of these improvements, management has taken four additional steps to improve the work ethic standards at BFN. The first involves stressing strict procedure compliance with a goal of zero personnel error events. Second, impediments to proper implementation are being defined and corrected. Next, the work ethic standards are being reinforced through superintendent meetings to discuss performance and to critique events with the results posted in the workplace. Finally, new policies involving progressive disciplinary action and a review of performance problems by an error review committee should help reduce personnel errors.

In addition, measures have been taken to increase management attention and involvement in the TS surveillance program. Specifically, TVA has set requirements for management involvement in field observations, in documentation, and in feedback of the results. TVA has also mandated management involvement in the V/V process so that management must review deficiencies that have been identified and must concur with changes. Also, in implementing the corrective action and incident investigation programs, emphasis is being placed on properly identifying the correct root cause of events and conditions to ensure continued improvement in the procedure program at BFN.

In summary, TVA has taken significant actions to improve the surveillance testing and procedures programs at BFN. TVA considers that substantial progress has been made and that additional progress will be made in the future. These actions are creating an operational mentality by which personnel recognize the need to stop work if a procedure is un lear, the need to take the time to do the job right, and the need for thorough reviews of events and conditions to determine the root cause.

IV. EMERGENCY PREPAREDNESS

This functional area includes activities related to the implementation of the Radiological Emergency Plan (REP) and implementing procedures. Relevant activities include REP development, support and training of onsite and offsite emergency response organizations, licensee performance during exercises, and

implementation of the REP during exercises and actual events. Performance is also evaluated with respect to event notifications and interactions between onsite and offsite emergency response organizations during exercises and actual emergencies.

During the SALP assessment period, several administrative and hardware measures were instituted to enhance the overall emergency preparedness (EP) program at BFN. These efforts were implemented to improve the responsiveness and effectiveness of the emergency preparedness program and BFN's response to an emergency situation. First, the entire emergency response organization was restructured and the Technical Support Center (TSC) was reconfigured to provide a more efficient and effective working area. The Operations Support Center (OSC) was also reconfigured from three separate OSC offices into one control center. These changes streamlined the organization and significantly improved communications. An additional enhancement which improved communications was the establishment of a direct telephone link between the control room, the TSC, and the Central Emergency Control Center to provide realtime information exchange between emergency facilities. This party line link eliminated major delays of onsite and offsite information exchange.

To further improve the emergency preparedness program at BFN, a three team duty roster concept and an automatic paging system were implemented to enhance emergency team response and effectiveness. Another programmatic enhancement involved upgrading the Emergency Preparedness Training program by adopting the INPO guidelines established for accredited programs. One major hardware change included installation of an enhanced personnel radiological emergency accountability system (PREAS). This eliminated the previous manual method of accountability and totally automated the process. The prompt notification system (PNS) was also expanded to provide fixed siren coverage throughout the 10-mile emergency planning zone. In addition, a status monitoring feature was added to the system. Validation of the effectiveness of these latter upgrades was demonstrated when the FEMA acceptance test of the PNS was successfully completed.

During the assessment period, two emergency exercises were successfully conducted: a partial participation exercise conducted on May 31, 1989 (as committed to NRC following the 1988 exercise), and a full participation exercise, which included the NRC Region II response team, conducted November 1-2, 1989. These exercises demonstrated the significant improvements that the BFN EP program has achieved and also that this program is more than adequate to provide reasonable assurance that the health and safety of the public and plant personnel will be protected in an actual emergency. During the May 31, 1989 exercise, NRC did not identify any violations or deviations, and identified only one inspector follow-up item (IFI). The IFI involved failure of the exercise scenario development team to have a clear understanding of the basis for classification of the postulated accident. As a result of this event, the root cause of the problem was identified and appropriate corrective actions were taken to prevent recurrence. Satisfactory implementation of the corrective actions was demonstrated during the November 1-2, 1989 full participation exercise which resulted in no inspector findings.

Also, during this evaluation period, a third EP program inspection was conducted. This inspection was conducted on March 27-31, 1989 and identified only one IFI involving failure to maintain proper documentation of communication checks. Following identification of the root cause, corrective actions were implemented to prevent recurrence. This identified item was later closed during an inspection conducted in September 1989, and the BFN EP organization currently has no open NRC items.

In summary, many significant improvements were made in this functional area during the assessment period. Overall performance during the two emergency exercises further indicates TVA's proficiency in this area.

V. SECURITY

This functional area includes the security program implemented to provide protection for plant vital systems and equipment. The evaluation addresses licensee activities associated with security plan and implementing procedures, management effectiveness, security audits, security officer performance, armed response, access control, physical barriers, communications, testing and maintenance, detection and assessment, alarm stations, power supply, and compensatory measures for degraded security systems and equipment.

During this assessment period overall performance improvements in this area resulted from both management/organization changes and specific program upgrades. Addressing management effectiveness first, there was a marked increase in management involvement in the day-to-day performance of the security program. This was accomplished by the establishment of a strong security management team at the site and the reorganization of the site security organization.

The reorganization provided direct line supervision of the security force. The site Security staff now also includes a Technical Support Supervisor who serves as project manager and system engineer to identify system deficiencies and oversee installation of new and improved equipment. A Maintenance Request Technician also serves on the Security staff, sustaining a sound maintenance program on existing and new equipment.

Overall, the objectives of the management team are improved individual performance, reduced personnel error, and increased accountability. In this regard, one significant accomplishment was the establishment of activities to track and trend security events. This program ensures prompt management response to trends in event occurrences to sustain an effective physical protection program and preclude event recurrences and violations. In NRC Inspection Report 90-04, NRC noted that "the trending being done . . . was impressive." An extensive Quality Assurance audit program was also established to ensure security program improvement. Regarding the overall audit program, NRC commented in the aforementioned inspection report that the audit program to which Security was subjected was noteworthy.

TVA also attempted to address individual performance during this assessment period. Personnel error in security officer performance has dramatically improved over previous SALP evaluations. Additionally, site security implemented a performance-oriented, hands-on training program for first- and second-line supervisors, armed officers, and designated armed response personnel. Site security also removed assigned officers from nonregulatory required industrial security posts to improve attention to detail on regulatory issues.

Improved equipment was provided to the security force personnel during the assessment period to increase security program performance. This included new semi-automatic handguns, anti-sniper rifles, and new vehicles. A state-of-the-art portable radio system has also been purchased and is scheduled for delivery in May 1990.

Significant improvements have been made in the quality and performance of security systems, which had previously been identified as a root cause of past security program performance difficulties. For example, TVA completed remodeling the west access portal and installed state-of-the-art search and detection equipment. Existing protected area barriers, perimeter intrusion detection systems, and isolation zones were upgraded. In addition, a dedicated security telephone line was added, a total plant key/lock control program was implemented, and control room bullet resistivity was improved.

Progress continues on an interim security system upgrade project scheduled for completion in 1990 which will reduce the protected area on the north and east perimeters and install a new east access portal with a vehicle salley port. This project will also improve lighting, isolation zone treatment, barrier quality, intrusion detection system performance, and closed circuit television (CCTV) coverage of the relocated perimeter sectors. An additional CCTV modification project scheduled for completion later in 1990 will upgrade CCTV coverage of those perimeter sectors not relocated by the interim upgrade project. Future changes include a permanent security system upgrade project which will resolve Central Alarm Station and Secondary Alarm Station deficiencies, and which will include installation of a state-of-the-art computer-driven access control and alarm system. During 1989, TVA completed development of specifications for this project, received bids, and identified a contractor for system design engineering and procurement. Contract award for this major milestone was approved by the TVA Board of Directors on April 19, 1990.

In summary, increased management attention to the physical protection program at BFN has resulted in a significant improvement in the security organization and its activities. TVA has completed numerous specific hardware enhancements and scheduled other future upgrades. In addition, during this assessment period the BFN security program had a very good regulatory compliance record.

VI. ENGINEERING/TECHNICAL SUPPORT

This functional area involves engineering and technical support for all plant activities. It includes licensee activities associated with the design of plant modifications; engineering and technical support provided for operations, maintenance, testing, surveillance, and procurement activities; training; and configuration management.

A. Engineering

In the area of engineering, several process changes were initiated during the assessment period. First, the design change process was significantly revised to eliminate inefficiencies. To accomplish this, Nuclear Engineering (NE) consolidated its project procedures associated with design change control (previously scattered within several procedures) into one requirements-oriented procedure. The new Engineering/Technical Support consolidated process incorporates requests for design changes and plant support into the design change notice (DCN) process. It also provides a simplified method to answer questions from plant personnel and to resolve discrepancies between the as-built plant and design drawings.

The quality of design changes was also dramatically increased during the assessment period. This is evidenced by the drastic reduction in the rejection rate of proposed design changes by the Plant Operating Review Committee (PORC). The improvement can be attributed to the new design change process discussed above, to the addition of a review by the Design Control Manager for package quality, and to the additional technical reviews of all design changes prior to issue. Another important factor is increased field support of modifications work by engineering, which reduces the misinterpretations of, and questions on, DCNs, and also serves to improve implementation of a DCN. Engineering personnel are now in the field 24 hours per day with mc'ifications personnel to assist in design change implementation.

Another significant improvement in NE was the implementation of a realtime scheduling system. This was accomplished by switching from mainframe-based scheduling software to PC-based software. The PC-based software permits NE to respond to requests for scheduling information faster and has increased the accuracy of project scheduling information. This change also, due to the software's user-friendliness, increases access to the system and encourages more frequent use by engineering personnel. Finally, the new software increases management's control of design production, improves awareness of production status, and allows management to become more involved in the design change process.

NE has also sought to improve its communications with other plant disciplines. This has been accomplished by participating more in day-to-day plant activities. For example, NE is now a member of PORC and attends daily senior site management planning meetings. NE has also

aligned the organization on a system basis such that individuals are responsible for systems to complement those in Technical Support and provide a focal point for channeling system-related information.

TVA realizes that further improvements are still necessary in this functional area. For example, NE plans continued revisions to the design change process to reduce the administrative burden associated with the current process, and also to further enhance the technical quality of design change packages. However, in the meantime, TVA has already taken many steps as highlighted above to improve engineering performance and the quality of design changes.

B. Technical Support

In an effort to improve performance in this functional area many improvements have been initiated. TVA specifically recognizes that in the past there were weaknesses in the area of root cause analysis. Accordingly, increased attention has been given to root cause assessment. Several extensive root cause analyses have since been performed, including the analyses of low residual heat removal (RHR) service water flow, low core spray room cooler air flow, and low RHR room cooler air flow. In these examples, the root cause assessment process helped properly determine the root cause and correct important problems at the plant. Additionally, station support groups routinely monitor selected root cause analyses to ensure that the proper root causes are being identified.

In addition, during this assessment period Technical Support established an administrative process to track and control special operability requirements and compensatory measures that originated from unreviewed safety question determination evaluations. Technical Support was instrumental in the development and implementation of the computerized LCO tracking system discussed above under the Shutdown Operations functional area. Technical Support also developed a formal process on the return of systems to operable status. This process requires parties involved at the plant to sign a checklist verifying that work needed to make a system operable has in fact been completed prior to declaring the system operable.

TVA has established plant system engineers at BFN as the technical experts on plant systems. These individuals provide support for maintenance, operations, testing, surveillance, and procurement activities on an individual system basis. In addition, they provide a single contact and coordination point for other site and offsite organizations. Administrative and procedural controls have been established to ensure the system engineers maintain daily cognizance of activities and issues affecting their systems. Implementation of the system engineering concept has resulted in better overall site coordination and more timely and efficient resolution of individual system problems and issues. In the NRC's maintenance team inspection report, system engineering was noted as a significant strength, "especially with regard to the [knowledge] and involvement of the personnel."

The operator training/requalification program was also improved significantly during the assessment period. The improvements were primarily due to increased communication between NRC and Nuclear Training concerning the requalification training process. The improved communications provided TVA with better insight into what NRC expects requalification training to address and also allowed TVA to identify and correct previous deficiencies in the program. For example, in response to one identified deficiency the training program was modified to include simulated examination training. The effectiveness of these improvements is evidenced by the results of the most recent requalification examinations in which all twenty operators taking the test passed (100-percent pass rate).

VII. SAFETY ASSESSMENT/QUALITY VERIFICATION

This functional area includes licensee activities related to amendment, exemption, and relief requests; responses to generic letters and bulletins; commitment tracking and closure activities; and resolution of TMI items and other regulatory initiatives. It also includes licensee activities related to reportability issues, 10 CFR 50.59 reviews, safety committee activities, and analyses of industry's operational experience. It also includes the effectiveness of the licensee's quality verification function and quality assurance activities. Also of some relevance to this functional area is participation in selfimprovement programs.

Site Licensing management continues to emphasize the need for improvements in this broad functional area. However, TVA has already taken many specific actions intended to improve performance with respect to many of the activities included in this area. For example, with respect to NRC licensing activities (including amendments, exemptions, relief requests, and responses to NRC generic communications), management is specifically focusing on the timeliness and quality of the submittals. This focus has been instrumental in improving the timeliness of completing NRC commitments. An example of this is the near elimination of a backlog of approximately 130 inspector findings and LERs for which work has been completed. In terms of corporate management initiatives, TVA accelerated the schedule for closure of TMI action items.

BFN has also devoted substantial attention to preparation for NRC inspections and meetings. This has resulted in marked improvement in the technical quality of the preparations and the ability of site personnel to respond to questions from NRC residents, regional personnel and headquarters personnel.

During this assessment period, the responsibility for preparation of licensee event reports (LERs) was transferred to the Site Licensing organization from a now defunct plant organization. This organizational change has resulted in an improvement in the quality of LERs and in better tracking of the commitments made in the LERs. Previously, responsibilities for LER preparation and commitment tracking were fragmented, preventing any organization from properly taking ownership of the LER resolution.

TVA's 10 CFR 50.59 safety evaluation process was significantly revised during this assessment period. This was accomplished by standardizing implementing procedures and clearly defining and increasing safety evaluation performer qualifications. The content and requirements of safety evaluation training were also enhanced. Further, the revised program is based extensively on the industry guidance found in NSAC-125, Guidelines for 10 CFR 50.59 Safety Evaluations, which was developed in cooperation with the NRC. The revised program provides guidance and examples addressing the standards of 10 CFR 50.59. The program also specifies screening criteria to determine when a safety evaluation is needed, and defines when a second level of review is required.

Significant changes were also made to TVA's Nuclear Experience Review (NER) process during this assessment period. A dedicated NER staff in TVA's corporate offices in Chattanooga is supplemented by NER staff at each TVA nuclear plant site, including three staff members at BFN. NER concentrates on the evaluation of NRC information notices and vendor communications. The upgraded NER program has provided TVA with improved capability to recognize and act on potentially significant safety issues. For example, following review of a violation against TVA's Sequoyah Nuclear Plant by BFN's NER group, action was taken at BFN to pull all TS interpretations until safety evaluations are performed.

With respect to safety committee activities, it is noteworthy that the Nuclear Safety Review Board (NSRB) was recently restructured and new management put in place as part of an effort to improve NSRB review and the handling of NSRB concerns. The TVA senior line management board member assignments have been revised to provide more operational experience and to bring experience to the boards from other TVA sites. The advisor membership has also been changed to increase operational experience and to have advisors serve on the boards for more than one TVA site. These changes are directed to ensuring that the NSRB will have a broad programmatic perspective with an emphasis on operational concerns. The changes are also intended to provide another forum for communication of problems and solutions between TVA sites.

The overall effectiveness of the quality verification function and the Quality Assurance (QA) organization were also greatly improved during the assessment period. This improvement was markedly demonstrated in two critical evaluations of the performance of the QA group. The first of these was a detailed inspection of performance at the site in the quality verification area. This assessment was specifically based on NRC inspection modules, as well as TVA procedures. It was performed in preparation for the NRC Quality Verification Inspection (QVI). Importantly, as a result of both the TVA selfassessment and Phase I of the NRC QVI, no significant deficiencies were identified.

The second of the two critical evaluations of TVA's QA performance was conducted under a cooperative management audit program (CMAP). This audit of the QA group was conducted by representatives of four other utilities. In the

end, the auditors awarded the TVA QA organization high marks for the overall implementation and effectiveness of, and the range of activities conducted by, the organization. Specific recommendations made by the CMAP team were also evaluated and addressed by TVA to further improve QA performance.

One factor that made a positive contribution to TVA's performance improvement in the quality verification area was TVA's adoption of an approach to prioritize QA activities. This approach allows management to appropriately focus resources on significant problem areas. In addition, TVA believes that this approach allows its QA personnel to be more performance-based and spend more time in the plant observing the plant configuration and work in progress.

Improvement in the QA organization is also evident in the changing approach of QA management, and in the perception of QA by other plant organizations. Specifically, the QA group has reoriented its philosophy from one of being limited to identifying quality deficiencies to one of participating in the problem resolution process. This participation has been enhanced through increased interface and communication with line organizations which not only alleviates the perception of just being problem detectors but also enhances a spirit of teamwork without sacrificing independence.

As a result of QA's new approach, it is also evident that there is improved communications and improved cooperation between the QA group and the line organizations at the site. This further enhances performance in the quality verification area. The overall effectiveness of the QA organization was demonstrated by the fact that INPO recently recommended to another utility the BFN program for monitoring safety-significant activities.

Also, during the assessment period, TVA implemented an organizational change to integrate the functions of the Engineering Assurance organization into the QA organization. This change has the benefit of streamlining and enhancing the quality verification functions for engineering work by consolidating the functions into one organization. This should improve the effectiveness of the quality verification function in identifying and correcting problems and in monitoring overall engineering performance at the plant.

In summary, TVA recognized the need for improvement in this broad functional area. During the assessment period, improvement efforts began to show results. Licensing activities are being conducted in a more timely manner and TVA is better preparing for NRC inspections. The safety evaluation and NER processes have been upgraded. Finally, the overall effectiveness of the quality verification function and the QA organizations was greatly improved as a result of several specific organizational and program approach changes. Many other self improvement programs not addressed in this section, but addressed in detail above under other functional areas, also contributed to TVA's performance in identifying safety problems and monitoring overall plant conditions.