ENCLOSURE 1

Tennessee Valley Authority

Browns Ferry Nuclear Plant (BFN) Unit 2

Systematic Assessment of Licensee Performance (SALP)

May 24, 1992 - June 19, 1993

Self-Assessment

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EXECUTIVE SUMMARY

In the previous SALP report dated September 10, 1992 (NRC Inspection Report 92-18), the SALP Board concluded that performance at BFN in all seven functional areas met or exceeded regulatory requirements. The highest rating, Category 1, was assigned to the functional areas of Plant Operations, Radiological Controls, and Emergency Preparedness. Safety Assessment/Quality Verification was rated as Category 2, Improving. Maintenance/Surveillance, Security, and Engineering/Technical Support received Category 2 ratings.

TVA has addressed previously identified weaknesses and has also undertaken efforts to improve plant performance in all functional areas. TVA believes these actions will ensure that BFN improves its performance and further efforts to become a consistent top performer in all functional areas.

"Major Accomplishments" and "Areas For Further Improvement" in each functional area have been identified and are summarized below.

Plant Operations: BFN operated safely and successfully with only one unplanned automatic scram occurring during the assessment period. Unit 2 set single unit BFN records for gross electrical generation and capacity factor. Major accomplishments include improvements in independent verification, attention to detail, and plant labeling; implementation of Revision 4 of the Boiling Water Reactor Emergency Procedure Guidelines; continued good performance on operator license examinations; and steps taken to minimize risk during the current refueling outage. During the upcoming assessment period, TVA will be focusing on improving management attention and expectations, Operation processes, and assistant unit operator performance.

Radiological Controls: To further enhance performance in this area TVA implemented a number of initiatives during this assessment period. Major accomplishments are numerous and include establishing a program that controls radiation exposure (BFN's 1992 collective radiation exposure and 3-year rolling average were in the best quartile of U.S. boiling water reactors), implementing measures that reduce source term, installing closed circuit television cameras, initiating use of robotics, implementing an interactive plant video tour system, and maintaining high water quality. Areas for further improvement in the upcoming assessment period include implementation of an automated access control program and laboratory data management system, enhancements to condensate demineralizers, and improving radiation worker practices.

Maintenance/Surveillance: Performance in this area improved during this assessment period. Major accomplishments realized include improvements in performance of independent verification, second party verification and self checking; maintenance training enhancements, benchmarking against top industry performers, and control of high risk troubleshooting activities. Other major accomplishments

include enhancing contractor training, developing a field implementation checklist, and overall Modifications performance. During the upcoming assessment period, TVA plans to focus on enhancing modifications staff experience and qualifications, the workplan and modification closure process, the procurement process, and Maintenance's attention to detail.

Emergency Preparedness: TVA implemented several improvement efforts to maintain and improve its performance in this function area. These improvement efforts involve upgrading emergency response capabilities, conducting off-hours staff augmentation and casualty control drills, implementing the safety parameter display system, and improving training during drills and exercises. Continued improvement in this area is planned through implementing revised emergency action levels and improving both the emergency response performance and facilities.

Security: Among the major accomplishments in this functional area are enhancements to the safeguards information program, the security tracking and trending program, and the access authorization program. Other accomplishments include upgrades to security equipment and training, and improvements in special nuclear material accountability. In the areas for further improvement, TVA plans to continue to focus on and aggressively pursue completion of the security upgrade project and the revision to the physical security plan.

Engineering/Technical Support: Since the last assessment period, a number of improvements in performance have been implemented in this area. Major accomplishments realized during this assessment period include improvements in contractor control, implementation of the Engineering Work Management System, use of the probabilistic risk assessment, implementation of the performance monitoring program, implementation of the drywell leak detection procedure, and initiation of the management senior reactor operator course. During the upcoming assessment period, TVA will be focusing on improving the system engineering program and engineering training.

Safety Assessment/Quality Verification: TVA has undertaken improvement measures designed to improve performance in this area and achieve a top rating. Some of these measures include improvements in the quality and timeliness of submittals and commitments, enhancements to the incident investigation program, formation of the Nuclear Assurance and Licensing organization, implementation of a performance-based evaluation methodology, upgraded Site Nuclear Assurance staff qualifications, and initiation of quarterly self-assessments of performance in the quality assurance area. During the upcoming assessment period, TVA will be focusing on enhancing the technical specification amendment request and incident investigation processes, and utilizing the offsite nuclear safety review group when conducting audits.

I. FUNCTIONAL AREA - PLANT OPERATIONS

In the September 1992 final SALP report, the NRC SALP Board rated performance in this functional area as Category 1. This was BFN's first Category 1 rating in this functional area since the SALP process was initiated. Problem areas were identified in independent verification, labeling, and attention to detail.

As more fully explained below, there have been numerous accomplishments in this functional area at BFN during the assessment period. TVA considers these accomplishments and improvements go beyond what was necessary to address the weaknesses identified in the previous SALP report. More importantly, these improvements have been carefully designed and implemented to continually upgrade performance at BFN. In this regard, TVA has laid a strong foundation upon which to further improve BFN performance in this area.

Major Accomplishments

1. Plant Performance

BFN's performance in this functional area may be most accurately reflected by the overall plant performance during the assessment period. In this area, Unit 2 performed well. For example, in 1992 Unit 2 set records for capacity factor and gross electrical generation for a single BFN unit (89.24% and 8.61 million megawatt hours, respectively). In both of these areas, Unit 2 was better than the industry average. In fact, Unit 2 ranked second nationally among boiling water reactors (BWRs) in electrical generation and fourth in capacity factor in 1992. During the assessment period only one unplanned automatic scram of Unit 2 occurred. In addition, prior to shutting down for the refueling outage Unit 2 had operated continuously for 121 days.

TVA considers this good plant performance can be attributed to many factors. Most important of these are management attention and emphasis on safe plant operation, as well as operators' performance and sense of ownership. Other contributing factors include effective preventive maintenance and maintenance trending programs, timely completion of surveillances, safe performance of pre-outage modifications work, the Site Engineering's Operations Support Group, use of the BFN Probabilistic Risk Assessment, activities related to the performance monitoring program, and system engineer support. These factors are discussed in greater detail in other sections of this enclosure.

2. Independent Verification Improvements

As noted in the 1992 final SALP report, TVA experienced problems in the previous assessment period with performance of independent verification activities. Since that time, however, TVA has expended considerable effort to improve in this area.

Prior to the assessment period TVA established a team of personnel from TVA's nuclear plants and corporate office to evaluate existing procedural requirements for performance of independent and second party verification, and also to determine how these requirements are implemented. The team identified numerous problems with TVA's procedures, such as inconsistent and excessive independent verification requirements.

As a result, TVA revised its corporate standard and BFN site procedures to correct these identified problems. For example, TVA eliminated unnecessary and excessive independent verification requirements, changed some independent verification requirements to second party verifications, revised the format for performing independent verification steps on safety-related systems to permit sequential steps to be performed and subsequently verified (e.g., perform 10 steps then verify the 10 steps), and removed independent verification steps from the body of the procedure and included them in a data sheet attached to the end of the procedure. These latter two changes permit first party and independent verification steps to be performed in a more logical progression.

Following completion of the procedural changes, TVA retrained plant personnel on these new requirements, and utilized the Nuclear Plant Improving Knowledge for Excellence ("NIKE") program to strengthen knowledge in this area. The NIKE program was implemented to improve ownership, knowledge, and performance; and also to minimize human performance-related problems and recurring problems. As part of this program, a monthly questionnaire on pertinent plant issues is developed and sent to plant organizations. Individual and organizational participation is encouraged through awards for overall group knowledge and group participation.

These measures have resulted in good improvement in performance of independent and second party verification activities during the assessment period.

3. <u>Attention to Detail</u>

Another problem area identified in the 1992 final SALP report involved attention to detail. TVA has focused management involvement to resolve this problem. While these efforts have not yet come to full fruition, positive results have been achieved with plant personnel. TVA is beginning to see some instances where increased attention to detail has reduced/mitigated potential problems.

For example, during the Unit 2 refueling outage, while taking equipment out of service to support the outage (equipment that is normally required to be operable), two instances which indicate increased attention to detail occurred. In the first instance, on February 9, 1993, while hanging tags for a hold order on one of the 4kV shutdown boards, the hold order directed the assistant unit operator (AUO) to pull a fuse in a certain compartment. However, the AUO

could not locate this fuse in the indicated compartment. Because this was not the expected result the AUO stopped his work on the hold order and contacted the Shift Support Supervisor (SSS - a licensed senior reactor operator) for guidance.

The second incident occurred two days later on February 11, 1993. In this example, while hanging a hold order in the recirculation pump trip breaker enclosures, the hold order directed the AUO to pull a fuse in a certain compartment. However, as in the previous example, the AUO could not locate the specified fuse in the compartment. Rather than proceeding, this AUO also stopped his work on the hold order and contacted the SSS for guidance.

TVA recognizes that although these instances demonstrate increased attention to detail, they do not indicate that the problem has been fully resolved. Furthermore, TVA is mindful that continued improvement in this area is contingent on management involvement and rigorous monitoring for early indications of potential problems. Therefore, TVA is committed to focusing management attention on this area to ensure that performance will continue to improve during the remainder of this assessment period and in the upcoming assessment period.

4. Plant Labeling

In its May 8, 1992, self-assessment letter, TVA identified completion of the long-term labeling program as an area that would require additional management attention to bring about improvements during the upcoming (current) assessment period. Additionally, in the 1992 final SALP report, NRC identified plant labeling as a weakness.

In mid-1992 TVA embarked on a new color-coded equipment relabeling project. As part of this project TVA developed standardized equipment identification labels for plant components. These new labels are color-coded to correspond to the unit's unique color, and have yellow or white letters to indicate whether a component is safety- or nonsafety-related. The labels utilize standardized nomenclature (unit, train, system, component, and subcomponent), unique identifiers (unit, type of component, system, and unique component number), and are bar coded (small labels are not bar coded due to size limitations). The bar code provides the standard component identification information and the normal position for the component, and can be read by the computerized operator rounds (see Item 12 below). In the future, TVA plans to utilize the bar coding during performance of valve lineups.

TVA initiated physical relabeling of plant systems with the Unit 2 Standby Liquid Control (SLC) System. TVA expects to complete relabeling this system prior to startup from the current refueling outage. Following completion of SLC, TVA will proceed to the Core Spray System, and will subsequently complete the remaining Unit 2 systems in conjunction with relabeling Unit 3 systems. Unit 1 systems will be relabeled prior to Unit 1 restart.

5. Commitment to Excellence

Commitment to excellence in plant operations was evidenced by many factors during this assessment period. TVA continued to utilize several successful programs which were initiated during the previous assessment period, including review of out-of-specification readings at the Plan of the Day (POD) meeting; special simulator training for startups, shutdowns, and unusual evolutions; and Operations management on shift during startups and shutdowns. TVA also conducted training programs to improve overall Operations management and shift management performance. This included command and control training, Kepner-Tregoe problem solving training, and time management training for shift operations supervisors (SOSs), assistant shift operations supervisors (ASOSs), and Operations management.

Another example of TVA's commitment to excellence is the additional training TVA will be providing to plant operators prior to startup to ensure that the operators are thoroughly familiar with the changes made during the outage. For example, plant operators will receive at least 56 hours of training on control room design review modifications prior to startup.

Still another example of this commitment is the procedure upgrade process currently in progress at BFN. This upgrade will significantly change the way procedures are used at BFN. Specifically, procedures will be designated as continuous use, reference use, or information use (procedures may also be designated as multiple-level use if more than one level applies to segments of the procedure). These new levels of use will clearly inform users when a procedure must be performed step-by-step or when a procedure can be performed from memory.

6. Implemented Revision 4 of Boiling Water Reactor (BWR) Owners Group Emergency Procedure Guidelines (EPGs)

On June 15, 1992, TVA completed revising the BFN Emergency Operating Instructions (EOIs) to implement Revision 4 of the BWR EPGs. The new EOIs are human factored and utilize a flow chart format. The EOIs were reviewed by NRC in Inspection Report 92-27. During this inspection, NRC stated that the "emergency operating procedure network was clear, concise, and reliable." The NRC also noted that the flowchart format was a significant enhancement over the multi-sided book.

7. Continued Excellent Performance on Operator License Examinations

During the assessment period BFN operators continued to perform well on operator license initial and requalification examinations. During examinations conducted in September and December 1992 all 32 candidates passed the examinations (one of the individuals had to retake the simulator portion of the initial examination). Furthermore, since January 1990, 93 of 94 candidates have passed initial or requalification examinations. (Note - NRC Examination Report OP-90-03 documents that 3 candidates failed initial examinations. However, two of these individuals reentered the training program and successfully passed initial examinations in September 1992.)

In NRC Examination Report 92-301, NRC identified performance of crews during the simulator portion of the examination as a strength. In this same inspection, NRC also identified the performance of the simulator facility as a strength.

TVA enhanced the operator license training program by developing the Operator Training Program Improvement Team to improve the hot license training program using total quality concepts (see Section VII of this enclosure for more detail on TVA's Total Quality program). The team is composed of plant, corporate, and training personnel. The team focused on the fact that while the overall success rate on NRC-administered initial license examinations is good, the BFN "through-put" rate (number of candidates completing program divided by number of candidates starting program) has been much lower than industry average. The team has completed its review of the program and is currently preparing to compile its findings and present the results to management.

8. Annunciator Markings for Testing or Disabling

TVA has initiated use of special color-coded bands to clearly indicate control room annunciators that are either being tested or are disabled. Two colors are used for Unit 2 annunciators: white indicates that the annunciator is involved in testing or maintenance activities, and blue indicates that the annunciator is disabled. TVA further expanded the use of these color-coded bands by adopting this concept for Unit 1 and 3 annunciators. Specifically, black bands with marigold colored letters (marigold is the standard Unit 2 color) are used on Unit 1 or 3 annunciators for common or support systems to indicate conditions that may impact Unit 2.

9. Additional Shift Support

Just prior to the beginning of the assessment period, TVA hired 45 additional AUOs to support long-term operation of all three BFN units. In addition, this permits TVA to provide licensed operator training to existing AUOs, and eventually, will permit training reactor operators as senior reactor operators. Since hiring these individuals, 25 have completed an accelerated course and are now on shift. The remaining 20 individuals are expected to complete the normal 70-week program in November 1993. To date, the attrition rate for this class has been zero percent, which is in marked contrast to previous attrition rates which have approached 17 percent.

10. Operations "Crew of the Cycle"

In November 1992 TVA initiated the "Crew of the Cycle" program at BFN to enhance operator performance through competition and recognition. In this program, each of the six BFN Operations crews are rated by Operations management and the SOSs in areas such as SOS command and control, sense of ownership, attentiveness and responsiveness to plant parameters and conditions, maintenance of system status and configuration control, repeat backs, review of operator logs, review of technical specification action statements, and conduct of safety briefings. Each 6-week cycle, a crew is awarded "Crew of the Cycle" for its superior performance during that cycle. The first award was presented on January 4, 1993. Additionally, the crew winning the most awards during the year will be further recognized and rewarded.

11. Work Control

Throughout the assessment period, TVA implemented enhancements to the work control process at BFN. TVA changed the work schedule from a 28 day to a 13 week schedule. This change minimizes the impact of emergent activities and reduces deferred maintenance by nearly 50%. In addition, TVA initiated preapproval of work activities in advance of performing the work. This change requires proposed work activities to be provided to Operations for review 7 days prior to being worked. This allows Operations ample time to review the proposed work activity and results in higher quality reviews and fewer errors. TVA plans to further enhance the work control process during the upcoming assessment period by integrating the Work Control organizations (TVA currently has separate Work Control organizations for Unit 2 and Unit 3) and by developing a common schedule for Unit 1, 2 and 3 work activities.

12. Computerized Operator Rounds

During the assessment period TVA initiated use of computerized AUO logs (AUO rounds) for observing and documenting plant conditions. During the rounds, the AUOs use a hand-held computer/scanner to read bar code labels for the component or instrument being observed (these labels are specifically for conducting rounds and are different than the previously discussed bar codes on plant labels). Following completion of the round, the AUO downloads the data directly to a personal computer in the control room. One of the primary benefits of the computerized rounds is that the computer provides a real-time verification of the date and time the reading was taken.

TVA began this program in September 1992 by performing initial computerized Unit 2 reactor building rounds in conjunction with paper rounds. Following completion of the trial implementation in November 1992, TVA phased in computerized rounds in the remaining Unit 2 areas. In addition, TVA has implemented computerized rounds for the Unit 3 reactor building, Unit 3 turbine building, and Unit 1 turbine building. TVA is currently phasing in the remaining Unit 1 and 3 rounds and expects to complete implementation of computerized rounds for all units by spring 1994.

13. Management Observation Enhancements

During the assessment period TVA upgraded Operations management observation checklists to utilize objective evaluation criteria that is standardized in all of the checklists. For example, the current Plant Operations Manager, Operations Superintendent, and SOS checklists provide specific items to observe during a Unit 2 shift turnover, such as plant status changes (hold orders, equipment lineups, load changes, etc.), technical specification and Appendix R limiting conditions for operation, and recent Operations Daily Index standing orders and procedure changes. Previously, these checklists only directed that the individual observing the turnover record any comments they may have had on the turnover.

TVA also initiated use of computer software and a computer scanned form to tabulate the results of the observations. This greatly increases the ability to track and trend performance not only by the individuals that performed the activity but also by the individual that observed the activity.

14. Outage Preplanning

On January 29, 1993, following a successful cycle, Unit 2 shutdown for its first refueling outage since 1985. In preparation for this outage, TVA management expended significant effort planning the outage to ensure it would be performed safely, on-time and within budget.

Management attention and involvement in refueling outage preparations is demonstrated by many factors. First, early in the assessment period TVA appointed a senior level manager as Outage Director. Second, TVA appointed task coordinators to directly supervise and facilitate major modification activities (e.g., the Electrical Maintenance Supervisor was assigned as the day shift task coordinator for control room design review modifications). Third, outage schedule and problem areas are discussed daily during the POD meeting.

Management attention is also evident in other areas. One example is TVA's participation in BWR Owners Group activities and the use of industry experience. For example, to prepare for the recirculation pump shaft replacement, TVA visited another BWR (Grand Gulf) to directly observe recirculation pump shaft replacement activities. Another example is the scheduling training provided to outage personnel. Specifically, outage personnel were trained on the plant's scheduling software at the vendor's facility in Boston, Massachusetts, and followup training was conducted at TVA's corporate offices.

TVA made use of human factors to improve outage processes and increase productivity. As an example, TVA appointed two 6-man groups to conduct defueling activities. This resulted in good performance in defueling the core. TVA also developed an outage handbook for all plant personnel. This handbook contains general plant information, outage goals and objectives, and names and phone numbers of critical outage management and personnel. Another management initiative to increase productivity is the incentive plan TVA developed for this outage. The plan basically involves financially rewarding plant personnel if certain established outage goals are met or exceeded.

To ensure that lessons learned from the outage are effectively utilized in the future, on March 1, 1993, TVA appointed a lessons learned coordinator. This individual is currently reviewing problems which have been experienced prior to and during the outage, such as work delays and schedule conflicts, as well as identifying major outage accomplishments. In addition, the coordinator is interviewing key personnel to identify process improvements to be implemented for future outages.

15. Shutdown Risk Minimization

While the focus of TVA's preplanning for the refueling outage included completion of the work on time and within budget, the primary focus was and continues to be safety. Prior to the outage, the Plant Manager and the Outage Director conducted meetings for plant personnel to emphasize the importance of safety. TVA also concentrated on minimizing shutdown risk through implementation of the NUMARC guidelines on shutdown risk and by utilizing the BFN Probabilistic Risk Assessment.

In addition, TVA established a shutdown risk assessment team to evaluate activities and ensure risk to the plant is minimized. The team is composed of the Outage Director, Outage Scheduling Manager, Outage Shift Manager, Technical Support Manager, Operations Manager, Technical Support Electrical and Instrument & Control Supervisor, Operations Superintendent, and a Senior Engineering Specialist. The team performed a detailed review of the initial outage schedule to identify risk contributors, reviewed two major schedule changes, and continues to review changes that affect safety system availability.

Areas for Further Improvement

1. Management Attention and Expectations

During the upcoming assessment period, TVA will undertake further efforts to improve BFN Operations performance. The first effort will involve heightening management attention and clearly defining and communicating management expectations.

TVA plans to accomplish this through several enhancements. First, TVA will continue to be more self-critical of Operations and Operations personnel performance. Second, TVA will be increasing supervisory management presence in the field with AUOs by licensing additional senior reactor operators and assigning them to perform field activities such as observing/coaching AUOs. Third, TVA is developing specific functional expectations for SOSs, ASOSs, UOs, and AUOs. This will allow management to more effectively evaluate performance and also to identify areas where personnel performance needs improvement. Finally, management will continue to stress its expectations for questioning attitude, attentiveness, and responsiveness to plant parameters and conditions to Operations personnel. Management will also ensure that Operations personnel are cognizant of and fully understand these expectations.

2. Operations Processes

The second effort TVA will undertake during the upcoming assessment period to improve overall Operations performance is the integration of Total Quality concepts/principles throughout the BFN Operations organization. To achieve this objective, TVA has developed a two-phased approach.

The first phase where these concepts/principles are currently being applied is in the development of an multi-organizational quality improvement team. The team was formed in December 1992 and evaluated Operations functions, identified areas for improvement, and prioritized these areas for resolution. The first area the team identified for improvement was the development of a single list or document that provides the location of plant components. The team is currently evaluating and developing the most effective solution to this problem.

The second phase will involve development and use of customer report cards to evaluate Operations performance. Other organizations which interact with the Operations organization would use the report cards to rate Operations' performance in specific areas. Operations would then use the results to identify areas for improvement. Currently, TVA is developing the criteria by which Operations will be evaluated and rated.

3. AUO Performance

In its May 8, 1992, self-assessment letter, TVA identified AUO performance as an area that would require additional management attention to bring about improvements in the upcoming (current) assessment period. While performance has improved and is generally good, as indicated by increased attention to detail by the AUOs, TVA will continue to take steps to enhance AUO performance.

Based on positive results to date TVA intends to continue rotating AUOs through each of the assigned positions to ensure that they retain proficiency in, and overall knowledge of, plant operations. TVA's Quality Assurance organization is currently identifying additional areas for improvement and performance problems during an ongoing objective-based evaluation of operations and AUO performance. Following completion of this evaluation, BFN's Training organization will develop and present seminars to AUOs to correct identified problems. These seminars will also be incorporated into AUO and licensed operator requalification training.

4. College Degree Program for Operators

TVA discussed its intentions to assist Operations personnel and other plant personnel to attain college degrees in a technical field in its May 8, 1992, self-assessment letter. Subsequently, TVA completed an evaluation of two programs offered by accredited institutions and selected the American Technical Institute to conduct onsite courses. The courses are currently planned to begin in October 1993. Personnel completing this program will earn a Bachelor of Science degree in Nuclear Engineering Technology.

5. Outage Scheduling Methodology

Based on lessons learned to date from the current refueling outage, TVA recognizes that to improve performance during refueling outages, several changes are necessary. First, required modifications must be identified earlier, and the design changes for these modifications must be completed and issued prior to shutdown for the outage. Second, TVA must maintain stricter control over the scope of work to be performed during the outage. Finally, TVA must develop and utilize a more user-friendly scheduling tool. Following completion of the refueling outage, TVA will be focusing increased attention on improving the scheduling methodology for refueling outages.

6. Computerized Hold Order System

In August 1991 TVA purchased and placed into service at BFN a computerized hold order (equipment clearance) system. Since implementing the system, TVA has developed more consistent hold orders and reduced the time necessary to prepare them. During the upcoming assessment period, TVA intends to further upgrade this system by tying the existing system into the Maintenance Planning and Control database and by adding system status capabilities. These changes will greatly improve coordination of work by providing the capability to generate electronic work packages and hold orders. TVA has assembled a team of personnel from TVA's nuclear plants and corporate office to develop and implement these enhancements. BFN is the lead plant for this effort.

7. Fire Protection Program

During this assessment period TVA has experienced problems concerning compliance with fire protection program requirements. These problems include inappropriate storage of flammable liquids, storage of oxygen and acetylene bottles in an unapproved manner and/or in unapproved locations, and wood material in the reactor building which was not being controlled by a transient combustible permit.

Many of these events and other similar events have been caused, in part, by a lack of sensitivity to the fire protection program. In some respects, these problems are similar to previous problems experienced with procedural compliance. Consequently, during the upcoming assessment period TVA will be focusing initial efforts on increasing sensitivity of personnel on the importance of compliance with program requirements.

TVA will also be focusing on increasing the efficiency of implementing compensatory measures. TVA's fire protection program permits a continuous fire watch for safe shutdown equipment to provide coverage for several fire areas (up to 3) provided that the fire watch observes each fire area on a frequency of once every 15 minutes plus or minus 5 minutes. TVA is currently evaluating expansion of this methodology to continuous fire watches for breached fire barriers (the fire protection program does not address this approach). Expansion of this methodology would result in a reduction of fire watches. This should increase management attention on the fire watches and also increase the quality of the fire watches.

II. FUNCTIONAL AREA - RADIOLOGICAL CONTROLS

Performance in this area was rated as Category 1 in both the June 1990 SALP report and the September 1992 final SALP report. Although no weaknesses were identified, TVA nevertheless implemented additional actions to maintain and improve superior performance in this area. Examples of these actions include source term reduction; implementation of closed circuit television, robotics, and an interactive video tour system; and improved use of the Post Accident Sampling System (PASS). These and other enhancements are discussed in more detail below.

Major Accomplishments

1. Control of Radiation Exposures

Throughout the assessment period, TVA continued its good performance in this area. TVA's efforts resulted in an accrued collective radiation exposure during 1992 of 172 man-rem per unit. This placed the site in the best quartile of all U.S. BWRs (best quartile was 266 man-rem per unit). BFN's three-year rolling average was 242 man-rem per unit (down from 258 man-rem in 1991), which also represents best quartile performance among BWRs (best quartile was 269 man-rem per unit), and is below the Institute of Nuclear Power Operations (INPO) 1995 goal of 255 man-rem per unit. In addition to maintaining overall dose as low as reasonably achievable (ALARA), TVA also maintained individual dose ALARA. Specifically, in 1992 no worker exceeded 2 rem at BFN.

This good performance can be attributed to many factors, most significant of which is management attention to maintaining dose ALARA. Initiatives to minimize personnel radiation exposure include reducing the source term, implementing use of innovative equipment and techniques such as robotics and the interactive video tour system, and extensive planning for the Unit 2 refueling outage. These are discussed in more detail below.

2. Source Term Reduction

During this assessment period TVA completed a number of actions to reduce dose in the plant. TVA completed chemical decontamination of the Unit 2 Reactor Water Cleanup (RWCU) and Recirculation systems during the current refueling outage (TVA committed to perform these decontamination efforts in the May 8, 1992, self-assessment letter). TVA also completed chemical decontamination of the Unit 2 Residual Heat Removal (RHR) system. These efforts resulted in removal of approximately 120 curies of radioactive material and an estimated savings of 260 man-rem during the outage. In addition, TVA installed taps on the Unit 2 RWCU and RHR systems to facilitate connections and reduce radiation exposure during future chemical decontamination efforts.

Additional measures implemented to minimize source term involve cobalt reduction efforts. First, during the current refueling outage, TVA is replacing thirty seven control cell control rod blades with a version containing non-stellite pins and rollers in the upper end. This replacement project will eliminate a significant source of cobalt-60. Second, TVA developed a cobalt reduction design specification to provide engineering requirements for evaluating and replacing cobalt containing components with alternate materials. This specification includes a list of plant valves that are significant contributors to the cobalt source term. Finally, TVA performed a modified controlled shutdown for the Unit 2 refueling outage to minimize cobalt crud bursts.

3. Closed Circuit Television (CCTV) Cameras

In its May 8, 1992, self-assessment letter, TVA committed to use CCTV cameras during the Unit 2 refueling outage. To date, TVA has installed 21 cameras in the Unit 2 drywell to monitor outage work (2 of the cameras are in the drywell clean room and one at each of the 3 drywell access points). Additionally, 5 cameras have been installed in the Unit 2 RWCU heat exchanger and pump rooms to support outage work. Cameras have also been placed in the Unit 2 steam tunnel, the turbine breezeway, and the Unit 3 drywell. Some cameras are also being used to perform a remote firewatch in the Radwaste building. Use of the cameras reduces manhours required for inspections, reduces radwaste generated through fewer required dressouts, and improves radiological surveillance capabilities. Currently, TVA estimates a savings of 17 man-rem through the use of CCTV during the refueling outage.

4. Initiated Use of Robotics

Another enhancement TVA committed to implement in its May 8, 1992, self-assessment letter was to purchase a remotely-operated robot to assist in work performance in radiation areas during the current refueling outage. In September 1992 TVA procured and placed into service a remotely-operated robot to provide remote surveillance and task performance capabilities in radiation areas. The robot contains a video camera and a manipulator arm, and is capable of climbing steps. TVA has used the robot for condenser air inleakage detection and remote surveillance of leak repair work. The robot has also been used to conduct leak detection in the Unit 2 RWCU heat exchanger room using a thermography gun. In the future, TVA plans to use the robot for remote surveillance and for recovery functions during radiological emergency activities.

5. Interactive Plant Video Tour System

Yet another enhancement TVA committed to implement in its May 8, 1992, self-assessment letter was to develop and implement a comprehensive and interactive plant video tour system. TVA began implementation of this system in late 1992. This system allows workers to "travel" through and view any area

of the plant using a computer, a videodisc player, and a joystick. This system can allow personnel to plan and "walk down" jobs without entering a radiation area.

In late 1992 TVA completed photography of accessible plant areas and implemented a partial operational tour system. TVA plans to photograph the remaining plant areas, including the Unit 2 drywell, near the end of the current Unit 2 refueling outage. Tour stations are currently located in the Radcon laboratory, the ALARA work area, and Work Control. The final version of the tour system will be fully implemented after the photography is complete. In conjunction with this work, TVA purchased a digital camera with updatable disc capability to enable TVA to update the system as future modifications are performed. This update feature also allows specific work evolutions, new areas, or new components to be photographed and developed into custom tour sequences for training purposes.

6. Radwaste Performance

During this assessment period TVA maintained an aggressive radwaste minimization program even while completing a comprehensive spent fuel pool cleanout project (69,000 curies of waste materials were processed and shipped as a result of the cleanout project). In 1992 BFN's volume of low-level solid radwaste generated was 110 cubic meters per unit, which places the plant in the best quartile of BWRs (best quartile was 180 cubic meters per unit). Additionally, the BFN 3-year rolling average of 85 cubic meters per unit is in the best quartile of BWRs (best quartile was 213 cubic meters per unit).

One measure which was beneficial in minimizing radwaste generated was the use of an innovative tool to remove and process Unit 3 condenser tubes. The tool extracted and split the tubes, then cut them into small segments. The tubes could then be easily packaged for shipment off site to be decontaminated, surveyed, and sold as scrap, rather than processed as radwaste. Another measure taken by TVA to reduce radwaste generation was the establishment of a new trash segregation facility. This facility ensures that clean trash is segregated from contaminated trash.

7. ALARA Planning for Unit 2 Refueling Outage

TVA implemented several ALARA planning initiatives to reduce dose during the Unit 2 refueling outage. Approximately 70% of the total estimated radiation exposure for the outage has been preplanned by task leaders and ALARA staff. TVA installed 35 tons of shielding in support of the refueling outage, which has resulted in an estimated savings of 91 man-rem. This shielding complements 42 tons of shielding already in place in Unit 1 and 31 tons in Unit 3. Additionally, TVA performed a top-to-bottom wipedown of the drywell which reduced contamination levels and consequently reduced protective clothing requirements.

8. Other Radcon Program Elements

During the assessment period and until the beginning of the refueling outage TVA maintained the contaminated area at approximately 3.4% of the radiologically controlled area (RCA). TVA also minimized personnel contamination events and detectable internal uptakes during this period. Specifically, less than 0.5 personnel contamination events per 10,000 radiation work permit (RWP) hours have occurred (43 events while working 863,687 RWP hours). In addition, only 9 uptakes have occurred (between May 24, 1992, and January 29, 1993), even while implementing a dedicated respirator minimization effort (minimizing respirator use reduces overall radiation exposure but may increase uptakes). Of these uptakes, the most significant was less than 0.01% of the quarterly limit for internal radiation exposure.

TVA upgraded existing monitoring capabilities by installing new personnel contamination monitors at RCA exits. These units are smaller and easier to use than the previous units. Additionally, TVA enhanced the computerized radiation exposure system (REXS) by implementing the automated issue of digital alarming dosimeters at control points and adding a backup computer for access control when REXS is out of service.

TVA further enhanced monitoring capabilities by adding a wireless remote dosimetry system. This new system allows digital alarming dosimeters to be fitted with transmitters which electronically send exposure data into a personal computer-based control terminal, which is monitored by a Radiological Control technician. This allows live-time remote monitoring of up to 20 individuals working in high dose areas. In addition, this new system eliminates the problem of blocked signals common in conventional teledose systems.

9. Improved Use of Post Accident Sampling System (PASS)

In the May 8, 1992, self-assessment letter, TVA committed to conduct additional training at the PASS panel to improve personnel knowledge about and proficiency in use of the PASS. Subsequently, on May 6, 1992, TVA initiated additional PASS analysis training and on May 21, 1992, initiated additional PASS sampling training. Approximately 75% of the chemistry technicians received this additional PASS training by November 30, 1992, and the remaining received the additional training through annual training. Following this training, TVA conducted observations of technicians conducting quarterly sampling and sampling during radiological emergency response drills. Based on these observations, TVA concluded that the technicians have the knowledge and skills necessary to operate the PASS effectively. Furthermore, annual training, quarterly sampling, and sampling required during emergency response drills should ensure that technician proficiency is maintained.

10. Radwaste Sump Inspection and Treatment Practices

In this assessment period TVA developed and implemented a program to improve the quality of water entering the liquid radwaste processing system. This program involves periodic monitoring of radwaste filter demineralizer performance, and periodic monitoring and visual inspections of plant sump water. Hydrogen peroxide is added when necessary to control biological growth. In addition, if the sumps are contaminated by fluids such as oil or electrohydraulic control fluid, the sumps are isolated and the contaminants pumped into drums. Subsequently, the sump contents (from the drums) are dewatered and shipped as radwaste. Implementation of these practices increases floor drain and waste collector filter efficiency (gallons processed per cubic foot of resin) and decreases radwaste generated from spent precoat resin.

11. Chemical Control Practices

TVA improved the chemical traffic control program during the assessment period. TVA accomplished this by establishing restricted use codes for chemicals, which are based on the intended use of the chemical. A companion effort to the establishment of use codes is the evaluation of chemicals on the approved chemical list to minimize the chemicals on the list, as well as to minimize products that generate hazardous or mixed waste. This evaluation is performed by a multi-disciplined team of affected plant organizations (e.g., Chemistry, Radiological Control, Engineering).

TVA also developed and implemented a bar code labeling system and tracking database for chemical containers. This bar code labeling system establishes individual responsibility and accountability, and the database enables tracking each chemical container from the point of receipt.

These improvements have resulted in a higher awareness of user accountability and responsibility for chemicals, a decrease in site hazardous and mixed waste generation, and a lower warehouse inventory due to nonduplication of products.

12. Chemistry Instrumentation Enhancements

TVA implemented enhancements to chemistry instrumentation during the assessment period, which has resulted in improved performance and reduced maintenance. TVA installed self-regenerating suppressors on the ion chromatograph (IC) which improves instrument reliability and reduces radioactive waste due to elimination of regeneration solutions and auto-regeneration cartridges. The suppressors are almost maintenance free, which reduces the dose from work on the on-line systems. TVA also installed robot-aided manufacturing autosamplers on two laboratory anion and two laboratory cation IC systems. These samplers provide better sensitivity due to increased sample size and reduce sample contamination due to decreased sample handling.

To improve BFN's metal analysis capability, TVA procured an inductively coupled plasma emission spectrometer. This spectrometer reduces fuel warranty metals analysis time, and provides better sensitivity and precision than the flame atomic absorption spectrometer previously used at BFN. TVA also upgraded the orbisphere dissolved oxygen sensors. These sensors are used to compare dissolved oxygen concentration with the on-line instrumentation. The sensors require less maintenance and allow longer time intervals between calibrations, resulting in greater availability and reduced radiation exposure.

TVA expects that chemistry instrumentation will be further enhanced through upgrades to count room equipment, such as the new nuclear data gamma ray spectroscopy system. TVA plans to implement this system by January 1, 1994.

13. Chemistry Water Quality

During the previous assessment period TVA consistently maintained good water chemistry on Unit 2. In this assessment period TVA continued its high level of performance in this area. The unit 2 average chemistry performance index for 1992 (and during the assessment period) was less than 0.20. This performance placed BFN in the top quartile of BWRs for Chemistry performance Index.

To maintain this high level of performance, chemistry water quality and other chemistry parameters are discussed daily in the POD meeting. TVA also implemented chromate and divalent cation monitoring of the reactor coolant. This monitoring provides additional information on contributors to conductivity increases during changing plant conditions.

Areas for Further Improvement

1. Implementation of Automated Access Control Program

TVA plans to implement a fully automated access control program in late 1993 to facilitate the RCA entry/exit process at BFN. Specifically, TVA has procured sufficient equipment (e.g., digital alarming dosimeters, dosimeter readers, and personal computers), which is currently being installed to support the program. The digital alarming dosimeters will be located in self service racks at the major access points to the RCA. This new system is designed to augment the REXS system and will automatically set the dosimeter alarm based on RWP dose limits.

2. Radiation Worker Practices

During the assessment period TVA experienced some problems with failure of workers to follow RWP requirements and radiological control procedures.

To address these problems, TVA is developing a field performance observation program for supervisors to identify and correct poor radiation work practices in the field. TVA is also developing an advanced radiation worker training program to improve worker practices and increase individual worker responsibility and accountability. TVA expects to complete development of these programs by late 1993, and will present the revised radiation worker training program to NRC prior to implementation.

3. Relocating Dosimetry Equipment

To improve the efficiency of dosimetry operations, such as processing special thermoluminescent dosimeter (TLD) pulls and whole body counts (WBC) which are required as a result of contamination events, TVA plans to establish an inplant WBC/TLD facility during the upcoming assessment period, by relocating existing processing equipment. TVA plans have this facility in service in late 1993.

4. Chemistry Technician Performance Enhancements

In the fall of 1992 TVA assessed Chemistry technicians' knowledge of fundamental chemistry principles. Based on the results of this assessment, TVA determined that chemistry technicians possess the knowledge necessary to perform their job functions. Nevertheless, TVA also identified areas where knowledge levels were lower than expected. As a result, TVA plans to focus future continuing training on those areas where knowledge levels are lowest. Additionally, TVA plans to continue to test and evaluate the technicians, and evaluate and improve the chemistry technician training program based on lessons learned.

5. Modifications to Condensate Demineralizers

To improve condensate demineralizer run times and reduce radwaste generation, TVA plans to upgrade the condensate demineralizers on Unit 2. This upgrade will optimize precoating equipment and techniques (body-feed and advanced-precoat), and improve backwash techniques (air-surge backwash). TVA plans to complete the physical modification on this upgrade during the next Unit 2 refueling outage. In the interim, TVA plans to continue to work on improving condensate demineralizer treatment system performance by using improved septa and optimizing precoat resin formulation.

6. Laboratory Data Management System

TVA has developed and implemented a computerized laboratory data management system at BFN to improve the process for recording and analyzing chemistry laboratory data. This system will facilitate tracking and analyzing data, and the generation of reports and charts. It will also be able to perform routine calculations. The system will reduce the time necessary to identify chemistry transients and, consequently, reduce the time needed to correct equipment problems.

TVA has completed loading chemistry data into the system and conducted initial training on the system in November 1992. TVA has scheduled additional training for late April 1993. TVA plans to further upgrade this system by setting up a local area network to permit automatic entry of laboratory instrumentation data. TVA expects this upgrade to be complete in 1994.

III. FUNCTIONAL AREA - MAINTENANCE/SURVEILLANCE

This was one of three functional areas designated as Category 2 in the September 1992 final SALP report. Weaknesses were noted in the use of self-checking, independent verification, and second party verification. The SALP Board also recommended that system alignment methods be reviewed to ensure the proper level of control is applied and confusion as to the use of the proper method is resolved.

As discussed below, TVA has implemented substantial improvements to effectively address these weaknesses and the Board recommendation. TVA has also implemented additional enhancements in this area to further improve performance, including craft training programs, performance benchmarking against top industry performers, and improved control of high-risk troubleshooting activities. Collectively, these and other enhancements were instrumental in helping the Maintenance and Modifications organizations achieve high levels of performance during the assessment period.

Major Accomplishments

1. Improvements in Verification Techniques

The September 1992 final SALP report noted that TVA continued to have problems with the three methods used to ensure correct system lineups (self checking, second party verification, and independent verification). The SALP Board recommended that system alignment methods be reviewed to ensure the proper level of control is applied and confusion as to the use of the proper method is resolved.

As discussed in more detail in Section I (Item 2) of this enclosure, in this assessment period TVA has focused management attention to resolve verification and self checking problems. TVA evaluated existing requirements for performing independent and second party verification. Based on the results of this evaluation, TVA revised site procedures to simplify verification requirements and also to clearly indicate when independent or second party verification was required.

TVA also implemented the "STAR" (Stop, Think, Act, and Review) self checking program. This program emphasizes stopping to identify the correct unit, train, and component prior to beginning the task; thinking by reviewing the intended action and expected response; acting by confirming, comparing and performing the intended actions without losing hand/eye coordination; and reviewing to verify the actual response was the expected response. The program is designed to help personnel understand the importance of self checking and when self checking should be used.

TVA has retrained plant personnel on the new independent verification requirements and provided initial training on the STAR self checking program. The NIKE program was utilized to strengthen knowledge in this area. TVA also initiated review of completed Maintenance work plans to identify other problem areas.

As a result of these efforts, improvement in performance of independent verification and second party verification activities has occurred during the assessment period. TVA considers that these efforts have resolved the weaknesses noted in this area during the previous assessment period. Nevertheless, TVA recognizes that management attention must continue to ensure that these problems do not recur.

2. Maintenance Performance

Maintenance performance continued at high levels throughout the assessment period. In the area of personnel safety, over 4.3 million man-hours have been worked in Maintenance without a lost time accident (dating back to July 1989).

The corrective maintenance backlog consistently exceeded goals throughout the assessment period. For example, at the beginning of the assessment period TVA's goal for the backlog was 300 and the actual backlog was 231. Due to continuing good performance TVA established a more challenging goal of 200 in October 1992. Although the actual backlog on October 31, 1992, (213) did not meet the goal, the backlog for the remaining months prior to shutdown for the refueling outage again exceeded TVA's goal (due to refueling outage work, the corrective maintenance backlog is currently above the goal). In the area of preventive maintenance, the ratio of preventive maintenance to total maintenance averaged nearly 84 percent during the assessment period, and over 99 percent of preventive maintenance items were completed on time.

3. Effective Maintenance Trending Programs

TVA utilizes the Maintenance Planning and Control (MPAC) database as well as INPO's Nuclear Plant Reliability Data System (NPRDS) to trend equipment maintenance history. These programs are used to perform a wide variety of trending reports, such as monthly component failure trending and semiannual NPRDS failure trending, as well as semiannual generic trend and failure code analyses. Throughout the assessment period, these trending programs have repeatedly identified problem areas and potential problem areas, such as repeated failures of the personnel contamination monitors, repeated failures of control air compressors due to overheating, and excessive maintenance on Residual Heat Removal Service Water System pumps for packing adjustments and/or replacement.

4. Improvements in Maintenance Training

TVA initiated many improvements in the Maintenance training area during the assessment period. With respect to Instrument and Control technician training, TVA committed to initiating an entry level training program for these individuals in the May 8, 1992, self-assessment letter. This program began on October 5, 1992, when 14 new technicians started the course. These individuals have completed approximately 1000 hours of plant and classroom training. TVA is currently taking advantage of plant conditions (shutdown) to provide in-plant training to these individuals. TVA expects that this 7000-hour training program will be complete in 1996. Similar programs for electrical and mechanical Maintenance craftsmen are currently in the in-plant training phase (electrical and mechanical craftsmen have completed approximately 4000 and 3200 of 8000 hours, respectively), and are expected to be complete by Spring and Fall 1994, respectively.

TVA has also implemented laboratory training upgrades. These include addition of valves and pumps (including motor-operated valve assemblies), an electronic circuit analysis simulator, a control rod drive changeout mockup, and electrical switchgear mockups. The electrical switchgear mockups will enable TVA to provide hands-on training to both Maintenance and Operations personnel on 4kV General Electric (GE) Magnablast switchgear, 480V GE AK type switchgear, and GE 7700 series motor control centers. Prior to adding these mockups, this training was accomplished only through on-the-job training and when plant equipment was available.

5. Maintenance Benchmarking

In March 1992 TVA formed a Maintenance process improvement team to benchmark the maintenance process against top performing plants. The goals of the benchmarking activities were to reduce work order cycle time, improve support function interface, minimize operating and maintenance costs, improve employee work environment to increase productivity, and validate optimum Maintenance staffing levels. The team, composed of members from TVA's nuclear plants and corporate staff, conducted the initial visit to Commonwealth Edison's Byron nuclear plant from May 19 through 22, 1992. The team completed the plant visits on July 17, 1992.

The team identified several process improvements during the benchmarking. Key actions currently in progress at BFN include reviewing the work order authorization process from inception to completion, reviewing overall coordination of work activities to identify process improvements, and initiating a pilot program for bar coding work orders. TVA is planning further improvements, which include developing an action plan for standardized predictive maintenance program methodology, and conducting meetings between Maintenance and Technical Support management to develop consistent

interface agreements and more effective distribution of functions. TVA will also be conducting meetings between Maintenance and Operations management to enhance the organizations' interface and to evaluate the benefits of rotating Operations personnel through the Maintenance organization.

TVA is also reviewing long-term improvement efforts such as empowering line supervisors/craftsmen to identify and proceed with corrective maintenance following troubleshooting, replan work orders in the field, and expand the scope of minor maintenance. Another long-term effort involves development and implementation of an integrated/automated database that fully supports the work control process.

6. Contractor Training Enhancements

In its May 8, 1992, self-assessment letter TVA identified training and control of contractors as an area that would require additional management attention to bring about improvements during the upcoming (current) assessment period. Discussed below are the improvements made by TVA in the area of contractor training (additional information concerning improvements in contractor control are discussed in more detail in Section VI, Item 1, of this enclosure).

First, TVA increased general training requirements and added general knowledge testing for contractors. For example, contractors are provided more detailed training on such subjects as hold orders, ALARA concepts, rigging and scaffolding, procedure adherence, and attention to detail. Second, TVA began task qualifying contractors in June/July 1992 for outage preparation work. Finally, TVA developed and implemented laboratory courses to train contract craftsmen. Implementation of these improvements ensures that contractor craft personnel receive adequate training and are qualified prior to performing work.

7. Improved Control of High Risk Troubleshooting Activities

On July 28, 1992, during troubleshooting on the feedwater level control system, Unit 2 experienced an unplanned automatic main turbine trip and reactor scram from an indicated high water level spike. TVA determined that this event was caused by inaccurate evaluation and diagnosis of prior feedwater system trouble symptoms and failure to anticipate the circuit response. TVA also determined that no administrative controls existed that required independent technical review of the troubleshooting activities.

As a result of this event, TVA revised its procedures to require development and independent review of troubleshooting plans for high risk troubleshooting activities on certain plant systems. In this new program, system engineers develop detailed step-by-step troubleshooting instructions, which are then reviewed by Operations, the Technical Support Manager, and the Plant Manager prior to being performed.

8. Modifications Performance

TVA made significant accomplishments in Modifications performance during the assessment period. Two of the major highlights in this area include developing the Field Implementation Checklist process and enhancing the computerized workplan writing system through a hardware upgrade, which are discussed in more detail below. TVA continues to use task managers to directly manage contractor modification activities - since October 1992 over 9,000 field observations have been performed. TVA also upgraded Modifications staff expertise through on-loan personnel from the Quality Control and Technical Support organizations, and the use of formerly licensed senior reactor operators to assist with outage preparations such as developing hold order boundaries and identifying Appendix R compensatory action requirements.

These measures were instrumental in improving Modifications performance. For example, unit rates for conduit supports were reduced from 32 man-hours per support in June 1992 to 16.1 in March 1993. The inspection/rejection rate for Modifications work was reduced from 6.8% in March 1992 to 2% in March 1993. In addition, significant pre-outage work was accomplished without adverse plant impact. This included over 1,228,000 total craft hours worked; and installation of over 71,500 feet of conduit, 8,200 conduit supports, 184,800 feet of cable, and 1,600 cable/wire terminations.

9. Developed Field Implementation Checklist

In the September 1992 final SALP report, control of contractors was repeatedly identified as a weakness. One of the actions taken by TVA to resolve this weakness involved development and implementation of the Field Implementation Checklist (FIC). The FIC is a detailed checklist of items that TVA task managers observe during development and implementation of modifications work. It was developed by TVA specifically to measure in-field performance of modifications work. TVA uses a personal computer-based software program to compile the observations into a composite summary of contractor performance. TVA considers that the FIC has been instrumental in ensuring adequate control of contractor work activities. The FIC was also recognized as a plus by NRC in BFN Inspection Report 92-41.

10. Enhanced Computerized Workplan Write System

In its May 8, 1992, self-assessment letter, TVA discussed implementation of the computerized workplan writing system to generate work plans for installing design changes. TVA enhanced this system in November 1992 by implementing a hardware upgrade which added a dedicated computer processor (previously the system used the site computer system). This improvement reduces time needed to generate work plans by 10-20%, and was instrumental in developing over 3000 work plans for the Unit 2 outage (at less than a 2% rejection rate).

11. Material Availability

In its May 8, 1992, self-assessment letter, TVA identified material availability as an area that would require additional management attention to bring about improvements during the upcoming (current) assessment period. During this assessment period, TVA has implemented a number of measures designed to achieve a high level of performance in this area.

In November 1992 TVA enhanced a line item database to monitor procurement activities from identification of material need to delivery. This database is used to generate daily status reports that list each work activity with material needs, whether the material has been ordered (if it is not available on site), the contract number and expected delivery date, when the material is needed in the field, and the individual responsible for expediting the order. The status reports are reviewed daily by management.

TVA also implemented enhancements to provide better support for the refueling outage. The first of these involves assigning materials coordinators to each design change. This increases ownership and accountability, which in turn provides additional assurances that problem areas will be quickly identified and resolved. The second enhancement involves the tagging of inventoried material as soon as the material need is identified in a plant work document such as a design change or work plan. Once tagged, the material is reserved for that particular work document. The last enhancement is the establishment of a dedicated area in the materials warehouse for staged material. In this area, tagged material is placed into an appropriate storage container ("bagged") and staged by the particular work document.

These measures have enabled the Material Organization to consistently meet or exceed a 95 percent service level during the assessment period, and also to minimize refueling outage work delays due to material need.

Areas for Further Improvement

1. Modifications Staff Experience/Qualification Enhancements

In the upcoming assessment period TVA will be focusing on enhancing the experience and qualifications of Modifications personnel. One initiative currently underway in this area is practical skills training for engineers and managers. An example of this training is the certification of Welding Engineering personnel as welders. These individuals have been assigned to perform welding tests for various welding techniques, including those requiring radiographic tests. This certification has given the welding group new insight into the welding training program, and has greatly enhanced the welding engineer's ability to coach welders in the field.

TVA will also be providing specific training to the task managers on various quality assurance activities, including nondestructive examination and routine inspection methods. This training should enhance the task managers' ability to observe field activities. Also in the area of quality assurance, TVA will be creating a rotational assignment with the Modifications and Quality Assurance organizations. This change will give Modifications and Quality Assurance personnel renewed appreciation for each other's functions, and will also give the personnel a corresponding new perspective on, and first hand understanding of, the other organization's activities.

2. Improve Work Plan and Modification Closure Process

To improve the closure process for modifications and the individual work plans for the modification, TVA has developed a two-phased approach to reduce the time required to close these items.

Phase I, which was completed March 19, 1993, involved development of software to automatically assemble work completion data. This process, developed in the same system and format as the work plan writing software, utilizes information entered when the work plan was written to develop the work completion statement. This allows personnel responsible for closing the work plan or modification to focus on the documentation which has changed during the implementation process, instead of needing to review all documents associated with the modification. This reduces the potential for errors during the closure process while increasing efficiency.

Phase II of the program will electronically tie the drawings and change paper for each work plan to Site Engineering's drawing change management system. Using the issue center for work documents as the control point, the check-out process will be used to automatically verify that the work plan contains the latest revision of necessary documents. This system will replace the manual verification process, which is time consuming, and will automatically alert users of changes to design output documents referenced in modification packages.

3. Improve Procurement Process

Although great strides in improving the procurement performance process have been achieved, TVA continues to evaluate additional measures to improve material availability and to streamline the entire procurement process. Recent sampling performed by TVA indicates that the procurement cycle is lengthy. In the upcoming assessment period, TVA plans to implement measures to improve performance in this area.

The first step in this process involves establishment and implementation of an electronic procurement system. TVA initially established a personal computer-based system for obtaining vendor quotations. However, this system had limitations due to its inability to communicate with the materials database. In the upcoming assessment period TVA will be replacing this system with a mainframe computer system that contains contract information, inventory levels, suppliers, and other relevant procurement information. This system will allow fully automated reordering of materials and components when the inventory reaches the established reorder point. This will reduce the procurement cycle time and eliminate paperwork since the only action required would be confirmation of the reorder quantity by TVA personnel. When an order is sent the supplier instantly receives the information and acknowledges receipt with delivery dates. Initial implementation of this system will be for ordering nonquality-related material. TVA expects to place the first order using this system, for routinely ordered chemistry supplies, by late 1993.

Further enhancements to this system include simplifying procurement contracts by implementing use of standardized quality and technical "reorder notes." This process essentially involves providing suppliers on the approved suppliers list with controlled copies of procurement specifications that have shortened codes for the specifications. When TVA purchases material, the purchase request would use these special codes to reference particular specifications, obviating the need for including bulky procurement specifications with each material order.

TVA will also be developing an automated system to track, trend, and measure procurement cycle times and process requirements. This system will allow TVA to identify those areas of the procurement process which need additional improvement.

4. Craft Team Building Training

In its May 8, 1992, self-assessment letter, TVA committed to implement and complete a team building training program, modeled after the Maintenance Supervisory Development Program, for Maintenance craft personnel. The training program consists of a one-week session concentrating on team building, customer-focus, total quality, and review of the concepts from the supervisory training program. The program was initiated on August 20, 1992, and was scheduled to be completed by March 23, 1993. However, due to scope of the refueling outage, completion of this program was extended to January 14, 1994.

5. Attention to Detail in Maintenance

During the upcoming assessment period TVA will continue to focus on further improvements in personnel attention to detail. TVA intends to accomplish this by increasing personnel awareness of the importance of attention to detail. To

accomplish this objective, TVA has developed a two-phased approach. The first phase, which has already been initiated, involves peer reviews/evaluations of completed work packages. This will identify any problems that have occurred in the performance of the work or in the documentation associated with the package. The second phase will involve increasing management emphasis on attention to detail during quarterly personnel performance evaluations. TVA plans to accomplish this by revising the performance evaluations to include attention to detail as an evaluation criterion.

6. Reliability Centered Maintenance (RCM) Program

The RCM program is an enhancement to the preventive maintenance program. It is a computerized system which provides a programmatic approach to developing and optimizing plant maintenance. RCM utilizes probabilistic risk assessment techniques, such as a decision logic tree, to identify equipment maintenance requirements according to safety and operational consequences, as well as the responsible degradation mechanism of each failure. Once fully instituted, this system will integrate RCM approaches with failure trending, root cause analysis, and craft feedback to ensure a superior program from the standpoint of safety and reliability.

In this assessment period TVA loaded the first two systems (High Pressure Coolant Injection and Reactor Water Cleanup) into the RCM program. Currently, TVA is loading the Condensate, Feedwater, Main Steam and Control Rod Drive systems, and expects to complete this portion of the project by September 30, 1993. Completion of the entire project is currently scheduled for mid-1995.

7. Maintenance Work Scope Growth Control

Late in the assessment period TVA experienced problems with work orders that did not specify the entire scope of work or did not adequately specify post maintenance testing requirements. As a result, TVA revised the Maintenance planner's guide to ensure that in-field scope growth is identified, properly documented in the work order package, and that proper post maintenance testing requirements are specified. To emphasize these changes, TVA will be conducting training on this new scope growth control methodology. TVA expects this training to be completed by the end of the current refueling outage.

IV. FUNCTIONAL AREA - EMERGENCY PREPAREDNESS

The NRC SALP Board rated performance in this functional area as Category 1 in the September 1992 final report. Although no weaknesses were identified, TVA nevertheless implemented several initiatives to maintain and improve performance in this functional area. Two of these initiatives involved upgraded emergency response capabilities and the conduct of off-hours staff augmentation drills. These and other improvement efforts are described in more detail below.

Major Accomplishments

1. Upgraded Emergency Response Capabilities

In its May 8, 1992, self-assessment letter, TVA committed to enhance BFN's emergency response capabilities by adding a second upgraded radiological environmental monitoring van. This van was purchased and placed into service on February 3, 1993. This van, which is similar to the first upgraded van, is used to respond to transportation accidents, radiological emergencies, and medical emergencies involving transportation of individuals who are injured and radiologically contaminated. The van is also used to provide environmental monitoring within the emergency planning zone. This new vehicle was designed by TVA personnel using human factors improvements such as a larger working area, a buffer zone between the contaminated area and the clean area, upgraded counting equipment, cellular telephones, and built-in electrical generators. These new vans improve the effectiveness of the environmental monitoring function.

Another measure initiated by TVA to enhance BFN's emergency response capability is the revised process for notifying the State of Alabama of emergencies. TVA revised the reporting forms that Operations personnel use to incorporate human factors enhancements. For example, for notifications of unusual events or alerts, the forms used by Operations personnel for providing information to the State no longer dictate compiling or providing information which is not required, such as meteorological data and airborne or liquid release concentrations. This results in more timely notifications of the Operations Duty Specialist and, in turn, State agencies.

The interactive video tour system and the remotely-operated robot, which were discussed in more detail in Section II of this enclosure, also enhance BFN's emergency response capability. In emergencies, the robot could be used to perform remote surveillance in those areas of the plant where conditions prevent personnel entry. Likewise, the interactive video tour could be used to help plan the use of emergency response teams in the plant.

2. Conducted Off-Hours Staff Augmentation Drills

In its May 8, 1992, self-assessment letter, TVA committed to conduct off-hours staff augmentation drills for each of the three emergency response teams. During the drills, which were conducted on February 4, November 4, and November 11, 1992, TVA demonstrated that the centers could be staffed with essential emergency response personnel and could be operational within the required one-hour time frame. TVA recognizes the benefits of these drills and will be conducting them for each of the three emergency response teams prior to December 31, 1993.

3. Continued Weekly Pager Tests on Days of Emergency Response Team Rotation

In June 1991 TVA instituted weekly notification and response tests of emergency response personnel. TVA continued to conduct these tests during the current assessment period to ensure proper operation of the automatic paging system and increase the sensitivity of plant personnel to emergency response responsibilities. TVA conducts these tests weekly on the day emergency response duties transfer from one emergency response team to another. Test results are reviewed by management during the POD meeting.

4. Reduced Radiological Emergency Plan Activations

In the previous assessment period, TVA activated BFN's emergency plan on five occasions when notifications of unusual events were declared. During the current assessment period, TVA has not declared any radiological emergencies.

5. Conducted Casualty Control Drill

On December 6, 1992, TVA conducted a casualty control drill at BFN that was observed by INPO. This type of drill differs from traditional emergency response drills in that instead of proceeding rapidly from the initiating event to core damage or significant offsite releases, it focuses on the in-plant response. Casualty control drills emphasize the individual response team's actions to identify and correct equipment failures and the plant's ability to handle simultaneous events. In addition, they offer positive reinforcement to emergency response teams by allowing the team to "win" by stopping the emergency or by preventing further damage if effective actions are taken. Conversely, if incorrect actions are taken, the event would become more significant. This drill has improved the emergency organization's ability to identify, correct and mitigate events which could lead to a radiological release.

6. Implemented the Safety Parameter Display System (SPDS)

During the current refueling outage TVA will complete a major enhancement to BFN's emergency response capabilities by completing installation of the SPDS at BFN Unit 2 (the SPDS will be functional by startup but will not be fully operational until the upcoming operating cycle). The SPDS has been tied to the integrated computer system upgrade which is being installed during the current outage. The new system is capable of switching from a direct feed of plant conditions to simulator-generated conditions during drills or exercises. TVA expects that emergency response capability will be further enhanced during the upcoming assessment period through addition of SPDS terminals in the Radcon and Chemistry labs, the Local Recovery Center, and the Operations Support Center. TVA is currently training operators and emergency responders on the new system.

7. Improved Training During Drills and Exercises

In the previous assessment period TVA improved the training provided during emergency drills by implementing use of the simulator for training drills, implementing the interim SPDS, and using mockups. Since that time, TVA has implemented other enhancements to further improve the training during drills and exercises.

For example, TVA mirrored the simulator control room to the plant control room as much as possible to ensure more realistic drills/exercises. This includes using NRC/Operations Duty Specialist ringdown phones, facsimile machines which are similar to the plant's, identical fire bells and actuators, and the same phone numbers as in the plant control room. On November 4, 1992, TVA initiated use of the simulator for conducting NRC graded exercises (the simulator had previously been used during internal drills.) TVA also added a hard-wired radio connection from the simulator to the plant radio system to allow operators in the simulator to use the plant radio system to communicate with plant personnel.

In addition, TVA increased the use of mockups during drills, and added other mockups which were built specifically for emergency response drills and/or exercises. Examples of these mockups include an electrohydraulic control system line failure, Reactor Building Closed Cooling Water System valve failure, and a joint failure in an air supply line to the reactor building airlock door seals.

8. Upgraded Emergency Response Capability of State and Local Agencies

In this assessment period TVA instituted several measures to upgrade the emergency response capability of State and local emergency response organizations. For instance, TVA maintained the reliability of the prompt notification siren system at 99.3%. TVA produced a training and public information video, which describes TVA's role in support of the radiological emergency plan, and distributed this video to the State's Emergency Management Agency and Radiological Health Department, as well as to local counties. TVA supported local counties in the development of a training program which allows county personnel to train local responders on an as-needed basis. This latter improvement eliminates previous problems associated with scheduling training and ensures that the counties have the necessary trained personnel. Finally, TVA provided additional dosimeters and survey instruments to the State for its field monitoring program.

9. Operations Support Center (OSC) Improvements

During the assessment period TVA implemented improvements to the OSC based on an area for improvement identified during conduct of an emergency drill. Specifically, during BFN's September 18, 1992, training drill, TVA discovered problems with the ability of existing staff members to identify, locate, and obtain spare parts to support maintenance and recovery efforts. As a result, on October 28, 1992, TVA added the Materials Coordinator and Maintenance Planner positions to the OSC, and on November 4, 1992, officially implemented the positions during the annual radiological emergency preparedness exercise. These positions are filled by individuals who routinely perform these activities and would therefore be better able to perform this function in an emergency.

10. Completing Implementation of Bulletin 79-18 (Notification of Personnel in High Noise Areas)

During the current Unit 2 refueling outage TVA will complete the implementation of Bulletin 79-18 by upgrading BFN's public address system and alarm system. This will include installation of strobe lights to provide visual notification to personnel in high noise areas; expanding the use of alarm bells; replacing existing speakers with improved speakers which more accurately reproduce sounds; and replacing mechanical sirens with electronic sirens, which allow better control of siren tones.

11. Opened Browns Ferry Energy Connection

On January 23, 1993, TVA officially opened the Browns Ferry Energy Connection at the BFN Training Center. This state of the art visitors center has a dedicated staff to support large tour groups and special interest visitors, such as schools and civic groups. The visitors center exhibits use interactive touch screen computers and laser disc videos which increase visitor involvement through hands-on participation. The exhibits teach visitors such things as how a nuclear plant works, how nuclear waste is stored and disposed, and how radiation is used to benefit today's society. The center also contains other unique exhibits, such as a cut-away section of a BWR fuel assembly. These exhibits combine to provide individuals with the positive aspects of nuclear power, as well as the benefits nuclear power in general, and BFN in particular, provide to local communities. It also helps individuals understand future energy generation needs, the environmental and safety concerns associated with nuclear power plants, and has greatly enhanced community relations.

Areas for Further Improvement

1. Implement Revised Emergency Action Levels (EALs)

TVA committed to implement, in its May 8, 1992, self-assessment letter, revised EALs at BFN following NRC approval of the NUMARC methodology and issuance of the final regulatory guide. During the assessment period TVA has taken several actions to implement this commitment.

First, in mid-1992 TVA assembled a team of personnel from BFN Operations, BFN Operations Training, and BFN site and corporate Emergency Preparedness organizations to evaluate the guidance and begin initial development of revised EALs. In mid-January 1993 the team completed the initial draft of the EALs based on this guidance. Currently, BFN's Site Engineering organization is developing calculations to support some of the radiation monitor readings used to classify emergencies in the revised EALs. TVA is planning to implement the revised EALs at BFN following approval by NRC and completion of training of Operations personnel and response team members.

2. Emergency Response Facilities Improvements

In the BFN June 3, 1992, training drill TVA identified weaknesses in the TSC and OSC with respect to human factors and effective use of space in these centers. TVA has previously implemented enhancements to these emergency centers, but recognizes that further improvement is needed.

As a result, TVA procured the services of an emergency response human factors consultant to evaluate the layout of the TSC and OSC, and make recommendations for improvement. The consultant completed the evaluation on September 30, 1992, and provided TVA with several suggested improvements. These included ergonomically designed modular furniture for better use of desk space and storage of reference material, partitioning the TSC to segregate decision making personnel (e.g., Site Emergency Director/Plant Manager, Plant Operations Manager, Site Vice President) from support personnel (NRC Coordinator, Security Manager, other clerical personnel), and raised platforms for better viewing and improved command and control by the emergency director. This latter enhancement will also allow cables for communications equipment and SPDS terminals to be routed under the platforms, which will further reduce clutter. Currently, TVA is evaluating these recommendations for implementation at BFN.

3. Emergency Response Team Performance

In its critique of the November 4, 1992, graded exercise, TVA identified problems in the communication/coordination between emergency response centers (TSC, OSC, control room and in-plant response teams), control of the radiological environmental monitoring teams, and the feedback provided to participants following the exercise. In Inspection Report 92-39, which documents the evaluation of this exercise, NRC also identified these problems.

During the upcoming assessment period TVA will be focusing on correcting these identified problems. TVA determined that the problems with the monitoring teams occurred during the transfer of control of the team from the TSC to the Central Emergency Control Center (CECC). TVA has reviewed this transfer process with TSC and CECC personnel and will emphasize it in future drills to ensure improvement.

To address communication/coordination problems, TVA has revised the BFN operator requalification training program to focus specific attention on the need for improved coordination and communication between the TSC, OSC, control room, and in-plant emergency response teams. TVA will also revise BFN training programs for the remaining emergency response personnel to emphasize the importance of coordination and communication.

Finally, TVA is in the process of revising the emergency drill critique process to improve feedback mechanisms.

V. FUNCTIONAL AREA - SECURITY

This functional area was assessed a Category 2 rating in the 1992 SALP report. One Severity Level III violation was identified for control of special nuclear material. The SALP Board, while recognizing TVA management's commitment to installing the security system hardware upgrades, recommended that TVA management continue to monitor the quality and timeliness of the installation of these upgrades.

Throughout this assessment period TVA management remained actively involved and has continued to pursue completion of the security upgrade project. TVA also developed and implemented additional measures to make BFN's Security Program a top performer. Details on these efforts are provided below.

Major Accomplishments

1. Safeguards Information (SGI) Enhancements

During this assessment period TVA initiated monthly random audits of SGI containers to verify the containers' contents and the custodian's understanding of safeguards requirements. A checklist is used to conduct the audit, which provides both consistency between the audits and documentable evidence of each audit. SGI custodians are retrained on any weaknesses identified during this audit. In addition to the random monthly audits, TVA recently completed an audit of the entire SGI program. Based on the results of this audit, TVA retrained SGI custodians to reinforce their overall responsibilities and address industry lessons learned, including problems identified at other TVA facilities. This training was completed February 18, 1993.

TVA also improved the SGI program by reducing the number of SGI containers, as well as the containers' contents. During the assessment period TVA eliminated 12 SGI containers. TVA reduced the volume of SGI by consolidating security procedures, and by revising forms, procedures, and drawings to remove SGI.

2. Security Training Upgrades

Security personnel have been provided additional training during the assessment period for the purpose of improving their performance in the field. TVA conducted initial orientation training (completed June 2, 1992) and update training (completed January 28, 1993) for the entire BFN security force on the security upgrade project. This training provided an overview of the project, such as the major changes that will be involved, the schedule, and compensatory measures. TVA has also provided task training on the upgrade project to security personnel. The initial phase of task training for security personnel was completed on December 2, 1992, and focused on the new equipment being installed as part of the upgrade. The second phase of task training was initiated

on March 1, 1993, and focused specifically on access control. Additional training related to the upgrade was completed on January 29, 1993, when the vendor of the new access authorization equipment completed training of TVA personnel responsible for plant access.

TVA enhanced the conduct of security training during the assessment period through the development and use of detailed lesson plans. For example, TVA developed detailed lesson plans for the security upgrade project training sessions discussed above, and for Revision 20 to the Physical Security Plan, which was recently approved by NRC.

Another enhancement to the conduct of training is the security alarm station computer training simulator which has been installed and is now operational. This training simulator is utilized to provide specific computer training on the new system to alarm station operators. Currently, TVA is approximately 50% complete with this training. The training is conducted by Security personnel who have completed vendor training and certification (training and certification was completed in September 1992).

3. Fitness for Duty

Throughout the current assessment period TVA continued to provide a working environment that was free from the effects of substances which would affect the ability of personnel to safely and competently perform their duties. This is demonstrated by the low percentage of positive random tests - 0.2% in 1992 compared to an estimated industry average of 0.4%. TVA continued to conduct off-hours and holiday random testing, and is currently averaging nearly 29 random tests per day (includes retests and followup tests), in addition to check-ins. In an effort to maintain performance and ensure continued conformance with NRC regulations, TVA's corporate Fitness for Duty Coordinator performs quarterly audits of BFN's collection facility. Any weaknesses or areas for improvement that are identified during the audit are promptly addressed and dispositioned.

4. Special Nuclear Material Accountability

TVA has completed actions to address previous SNM issues raised in NRC Enforcement Action 89-239 and in NRC Inspection Report 91-33. Specifically, TVA completed removal of non-essential components from the pools, including control rod blade stellite rollers. This was actually completed on May 20, 1992; however, since the benefits from this activity were realized during this assessment period, it is treated as a major accomplishment for purposes of the current evaluation. Following removal of these components, TVA completed final videotaping of the pools. As a result of the spent fuel pool cleanup efforts TVA shipped approximately 69,000 curies of material offsite.

In addition to the cleanup of the pools, TVA procured the services of a consultant to review all aspects of BFN's SNM program, including storage areas and containers, SNM accountability, and SNM records; and to provide additional suggested improvements to reduce the probability of future problems. The consultant completed his review on May 11, 1992, and concluded that the SNM program was being conscientiously implemented by a well-trained staff, and that a heightened awareness of SNM control and requirements existed throughout the site.

The consultant also provided recommendations for further enhancement of the program. Based on these recommendations, TVA reduced the number of areas where SNM can be stored and revised the training program for Radiological Control technicians by adding training on SNM identification and accountability. TVA also implemented administrative controls to have the SNM Custodian review and approve purchase orders for SNM prior to ordering the material.

As a result of these actions, TVA considers that it has fully resolved previous concerns with the control and accountability of SNM at BFN.

5. Comprehensive Security Tracking and Trending Program

Throughout this assessment period TVA continued to perform in-depth tracking and trending of security-related personnel errors and system component malfunctions. Both monthly and quarterly trend reports are issued and reviewed, and the results compared to other TVA facilities and other utilities. TVA also reviews specific personnel and component errors from other facilities to identify areas at BFN that may require improvement.

6. Revised Access Control of Containment

During this assessment period TVA moved the security access control points to the reactor building entrances at secondary containment rather than at primary containment entrance points. This measure maintains compliance with access control requirements and offers a higher degree of security, since personnel entering the reactor building are subjected to positive access control measures by a member of the security force. This also reduces the required number of security posts which results in more efficient utilization of resources, and reduces the dose accrued by Security personnel.

7. Improvement in Morale

TVA implemented wide ranging programmatic and management philosophy changes during this assessment period which resulted in an improvement in employee morale.

One of the changes in management philosophy was increasing employee involvement in major processes or changes that affect security personnel. For example, TVA formed a security upgrade committee, composed of both management and officers, to coordinate upgrade activities, training requirements and general information associated with the upgrade. Other examples where officer input and involvement is solicited include proposed changes in post assignments and procedure revisions. This has resulted in a turnaround in the relationship between management and officers.

Equipment improvements which have been implemented during the assessment period have also been instrumental in improving morale. The most significant of these is the upgrade project, which is discussed in more detail below. Other equipment improvements include the new weapons, body armor and equipment vests discussed below, new security vehicles, and new day-use binoculars.

Additional changes which have improved morale are the Customer Focus and Total Quality training TVA provided to security force personnel during this assessment period and the previous assessment period, and the Professional Development Program which was implemented in December 1992. This latter improvement was developed to allow Security personnel within the chain of command to enhance their career paths through on-the-job work assignments.

Collectively, these changes demonstrate management's commitment to security force personnel and to further developing the capabilities of the personnel.

8. Response Equipment Upgrades

During the last assessment period, TVA purchased new weaponry to further improve the effectiveness of BFN Security. During this assessment period TVA continued to improve effectiveness by purchasing additional new weapons, body armor and equipment vests. Specifically, TVA purchased semiautomatic shotguns to replace older model pump shotguns. The BFN security force completed training on this weapon on September 10, 1992. Additionally, new lightweight and comfortable protective body armor was purchased to provide armed responders maximum protection during contingency situations. In conjunction with the new body armor, TVA also purchased equipment vests to be worn over the armor. These vests are human factored for contingency situations and offer convenient storage of necessary equipment, such as ammunition and radios, as well as improved access to this equipment.

9. Access Authorization Program

During the assessment period TVA established an improved, more reliable check-in/check-out process for BFN personnel. TVA tasked BFN's Site Security organization with the primary responsibility for contractor check-ins. This function was previously performed by the Employee Relations & Development (human resources) organization.

To ensure effective implementation of the check-in/check-out process, a site coordinator was appointed. The coordinator, assigned from the security organization, is the primary point of contact for employee processing. In addition, the coordinator conducts weekly meetings with contractor organizations and plant organizations responsible for portions of the check-in process (e.g., training, medical). During these meetings, any problems experienced during check-in are discussed, as well as plans for upcoming check-ins. This process establishes coordination and strict control over the entire check-in process, and provides for prompt resolution of problems and concerns.

Areas for Further Improvement

1. Security Upgrade Project

Throughout the assessment period, TVA continued to proceed with engineering and modification work, as well as training, to implement the $28 million security upgrade project at BFN. Engineering work has been completed and construction, which was initiated on August 17, 1992, is approximately 40% complete.

The project has been divided into six phases. Phase I, which comprises approximately 60% of the work, involves major modification activities such as new alarm stations, a new west access portal, changes to the east access portal, an improved computer system, upgraded protected area perimeter barriers and intrusion detection system, and new access control equipment for the vital area portals. The remaining five phases primarily involve installation of lighting, and additional protected area barrier and intrusion detection equipment not installed as part of Phase I. These phases will be completed in smaller segments to ensure effective compensatory measures during installation of the new security equipment. TVA will transition to the new systems installed in Phase I following completion of installation and appropriate post-modification testing.

Additional security upgrade modifications, such as a new vital area door alarm and access system, will be performed separately from the phased approach for the perimeter work. This additional modification work will continue throughout the duration of the upgrade project.

BFN's Security organization has been actively involved in all phases of this project, from conceptual design through performance of the on-going modifications activities. For example, early in the project TVA established the Security Project Coordinator position to coordinate transition requirements, manpower utilization and other regulatory issues associated with the project. Another example is the detailed transition plan TVA developed for implementing the upgrade project. This transition plan was recognized as thorough and detailed by NRC in Inspection Report 92-34. Yet another example involves augmenting the security force to fully support the upgrade project and the Unit 2 refueling outage. This was accomplished on August 10, 1992, when TVA added 10 security officers and October 5, 1992, when TVA added an additional 13 security officers to the security force. This high level of involvement will continue until the project is completed.

On February 10, 1993, TVA suspended construction and installation work associated with the upgrade after TVA identified problems in the contractor's implementation of certain modifications. Corrective actions were developed and are currently being implemented, and limited construction activities have resumed. As a result of these activities, completion of Phase I of the project, which was projected for March 31, 1993, will be delayed.

2. <u>Revise the Physical Security Plan (PSP) to Reflect Security Upgrade</u>

Revision 20 to the PSP, which TVA submitted to the NRC July 23, 1992, provided the compensatory measures to be utilized during installation of Phase I of the security upgrade project. Following completion of Phase I, TVA intends to submit to NRC a completely revised PSP. Since this document will be a complete rewrite, TVA will submit the document as "Revision 0," rather than a continuation of existing plan revisions. TVA has completed a draft version of Revision 0 and has provided the first four chapters to NRC for an informal review. TVA has also conducted initial meetings with NRC to address any questions and/or comments. In addition, TVA has completed a total site security procedure upgrade and consolidation to incorporate the Revision 0 requirements. These procedures became effective April 5, 1993.

VI. FUNCTIONAL AREA - ENGINEERING/TECHNICAL SUPPORT

Performance in this functional area was rated as Category 2 in the September 1992 final SALP report. A limited number of problem areas were identified, including control of contractor activities, bends in sample lines that were not thoroughly evaluated, two isolated incidents of failure to update primary drawings, and the untimely resolution of a problem associated with the control room emergency ventilation system. Additionally, the SALP Board recommended that contractor monitoring be enhanced to ensure adequate control continues.

Since the last assessment period, improvements in performance have been implemented in this area. Organizational changes as well as increased management attention have resolved previous problems associated with contractor control, and the problems with the control room emergency ventilation system will be resolved prior to startup from the refueling outage. Many other initiatives were also taken to further improve performance in this area. These are described in more detail below.

Major Accomplishments

1. Improvements in Contractor Control

In its May 8, 1992, self-assessment letter, TVA identified training and control of contractors as an area that would require additional management attention to bring about improvements during the current assessment period. Additionally, in the 1992 final SALP report, control of contractor activities was cited as a weakness. Actions taken to strengthen training programs for contractors was previously discussed in Section III of this enclosure. Discussed below are the initiatives undertaken by TVA to improve the control of contractors.

When the assessment period began, TVA had a separate organization at BFN responsible for recovery work on Units 1 and 3, and another organization responsible for operating Unit 2. In October 1992 TVA reorganized these functions and consolidated the recovery functions into the operating organization. At the same time, contractors were integrated into TVA organizations. This resulted in direct TVA management control of contractors, and also in elimination of separate contractor procedures to control implementation of engineering and modification processes.

TVA management control of contractors was increased through development of the Field Implementation Checklist process. This innovative process was discussed in more detail in Section III of this enclosure. Development of this process was recognized as a plus by NRC in Inspection Report 92-41.

TVA recognizes that control of contractors is an area which will require continuous management attention until both Units 1 and 3 are restarted. TVA believes that the changes discussed above have not only resolved previous problems experienced with contractor control, but will also ensure that adequate control is maintained. Evidence of increased management control of contractor work activities was recognized by NRC in Inspection Report 93-04. In this report NRC identified the control and knowledgeable engineering supervision of ongoing control room design review field modifications as a strength.

2. Operations Support Group

In May 1991 TVA established the Operations Support Group within the Site Engineering organization. This group, which is managed by a formerly-licensed senior reactor operator, is responsible for providing short term engineering evaluations for emergent plant conditions (e.g., obsolete part equivalencies, temporary camera installations, shielding packages, heavy lifting/rigging). The group interfaces directly with the Operations, Maintenance and Technical Support organizations and is an integral part of the BFN team.

Throughout the assessment period, this group has provided timely engineering designs to resolve operational issues. Examples include repairing the supplemental fuel pool cooling residual heat removal cross-tie valve, and cutting capping vent/drain lines, and cutting out and capping corroded Emergency Equipment Cooling Water (EECW) System flush lines while in a 7-day diesel generator limiting condition for operation. In NRC Inspection Report 93-04 NRC recognized the timely engineering support for the EECW flush line modification (the modification package was developed and implemented in 4 days). The group also provided design output to install rigging for Unit 2 recirculation pump shaft replacement work, and issued shielding packages for the drywell and other special configurations to minimize radiation exposure during the refueling outage.

3. Engineering Work Management System

TVA has enhanced engineering support of the plant through effective use of work management techniques. These techniques are applied to engineering tasks beginning in the development phase and continuing through completion. Important process features include establishment of challenging performance goals; a dedicated organization to support plant events which require short term engineering evaluation; and close coordination between Site Engineering and other plant organizations. Additionally, resource loading and leveling techniques, and work-off curves are used to maximize available resources and minimize backlogs.

Site Engineering makes extensive use of computer systems to track and trend this information, as well as to coordinate planning efforts. Use of the work management system has been instrumental in ensuring drawing revisions are issued within procedural timeframes, maintaining low drawing backlogs, issuing designs in a timely manner, improving coordination for designs requiring multi-disciplinary effort, and promptly resolving design issue restraints.

4. Use of the BFN Probabilistic Risk Assessment (PRA) to Support Plant Operation

TVA continued to use the PRA during the assessment period to support plant operation and increase the safety margin for performance of certain activities. For example, TVA used the PRA to perform system evaluations to sequence valve testing and identify high risk valves for motor-operated valve testing in accordance with Generic Letter 89-10. TVA increased the availability of the High Pressure Coolant Injection and Reactor Core Isolation Cooling Systems through revised surveillance testing intervals (added 12 days availability per year). This latter change also decreases core damage frequency. The PRA was also utilized to calculate tornado missile strike frequency for duct work, which eliminated the need for additional missile shielding for the turbine building roof.

Another example occurred during the previous assessment period when TVA determined that a section of the Reactor Water Cleanup System did not contain two check valves and had not been adequately evaluated by the vendor. In this incident TVA used the PRA to support continued operation for a postulated break in this section of piping concurrent with single failure of the check valve.

5. Drawings

A key strength of TVA's engineering process is the effort expended to ensure drawings reflect the actual plant configuration. During the assessment period TVA continued its exemplary performance in this area.

One of the key features of TVA's drawing program is the procedural requirements for updating drawings following modifications. Specifically, BFN procedures require primary, critical and essential secondary (PCE) drawings to be revised prior to system return to operation (RTO). Other secondary drawings are required to be updated within 180 days of modification completion.

During the assessment period TVA revised all PCE drawings prior to system RTO. TVA averaged less than 4 days per drawing for the 318 drawings that required revision. With respect to other secondary drawings, TVA averaged less than 39 days per drawing for the 917 total drawings that required revision. This is less than TVA's goal of 40 days per drawing and is much less than the procedural requirement.

TVA also expended considerable effort to revise drawings and reduce the backlog of drawing discrepancies. For example, during the assessment period TVA issued 11,349 drawing revisions to a population of 9566 drawings. TVA reduced the backlog of secondary drawings from 6,101 at the beginning of the assessment period to the current level of 4376. In addition, TVA reduced the backlog of post-restart drawing discrepancies from 2,610 on May 24, 1992, to the current level of 989.

6. Implementing Lessons Learned From Customer Focus Training

During this assessment period customer focus training has been instrumental in building an internal team network that has improved overall communications both within the Site Engineering organization and with other organizations. This effort has also resulted in better team building within the organization and with other plant organizations. In addition, this training has been a key element in achieving organizational goals and increasing efficiency.

7. Engineering Performance Improvement Process

Just prior to the assessment period TVA formed an Engineering process improvement team to benchmark TVA's engineering process against top performing plants. The team consisted of engineering management personnel from TVA's nuclear plants and corporate office, and was led by BFN's Site Engineering Manager. The team was tasked with identifying key engineering areas to evaluate and comparing BFN's performance in these areas with the performance of other top performing plants. To accomplish this goal, the team met with senior management of selected utilities during June and July 1992.

As a result of this benchmarking effort, TVA identified a number of enhancements to incorporate into its engineering program. For example, TVA developed a performance indicator system to measure performance of key engineering processes. This enables engineering to compare performance to an established base level or initial level. Another example is the establishment of challenging performance goals. TVA established performance goals for most of the organization's activities, including design change notice (DCN) costs, DCN closure durations, DCN rejections, and drawing issuance timeframes. Performance indicators and goals have become an effective tool to measure overall organizational performance and to determine the areas where management needs to focus attention.

The benchmarking effort also identified areas where TVA's design change process could be enhanced. This led TVA to develop innovative mechanisms, such as special design changes for minor changes or material equivalency evaluations, to make the design process commensurate with the required level of effort and the required level of configuration control.

8. Performance Monitoring

In April 1992 TVA established the performance monitoring program at BFN. This program, which was originally developed to identify early detection of degradation of systems and equipment important to plant safety and efficiency, was refocused to optimize turbine cycle performance and maximize generator output within the bounds of safe plant operation. The program is administered by a performance monitoring team composed of system engineers, Operations personnel, and Maintenance personnel. The team meets daily to review plant performance during the previous 24-hour period (except on weekends). The team then meets with the Plant Manager to discuss results and make recommendations to improve performance.

During the assessment period TVA has observed many benefits from this program. As discussed in Section I of this enclosure, BFN Unit 2 set records in 1992 for gross electrical generation and capacity factor, and the thermal heat rate consistently exceeded goals. This was due in part to suggestions provided by the performance monitoring team, such as recommending that feedwater temperature indicators be calibrated following indication that one of the temperature indicators was reading less than the others, which resulted in a "gain" of 7 megawatts thermal power. The team also recommended reducing control rod drive flow which increased reactor heat output, and recommended that condenser tubes and the tubesheet be inspected, which resulted in identification of tube fouling (subsequent cleaning reduced condenser backpressure).

In addition, the performance monitoring team identified several modifications to improve unit reliability and efficiency. These included feedwater heater level controls upgrades, condensate demineralizer controls upgrade, removal of the feedwater pump vibration trip, elimination of mechanical linkage controls on feedwater pumps, and improved controls for a flow control valve in the condensate system.

9. Developed Return to Service Procedure for Use Following Refueling Outages

On October 21, 1992, TVA implemented a detailed system return to service procedure for Unit 2 for use following refueling outages. This procedure provides a systematic method to ensure that items affecting plant operability are addressed prior to fuel load. The procedure defines the refueling test program to be utilized for startup, and also includes detailed fuel load, startup, and system review checklists. On March 12, 1993, TVA revised the procedure to update the refueling test program overview table, and clarify responsibilities and requirements for completing system review checklists, the fuel load review checklist, and the startup review checklist.

10. System Engineering

Throughout the assessment period, the BFN system engineering group continued to provide thorough support for operations and maintenance activities. BFN system engineers direct troubleshooting and repair of plant systems which results in increased plant reliability by preventing unplanned shutdowns and minimizing startup delays. System engineers also apply a philosophy of ownership to their respective systems. As a result, they have been instrumental in ensuring safe, continued plant operation.

System engineer support of plant activities was enhanced during the assessment period through increased participation by system engineers in BWR Owners Group activities. For example, system engineers have been actively involved in BWR Owners Group committees on BWR stability, reactor vessel water level indication, and reactivity control. System engineers have also been instrumental in providing assistance to other organization for refueling outage support. For example, system engineers were loaned to the Modifications organization to supervise work plan writing activities for installation of design changes.

In summary, TVA's system engineering program has been successfully implemented at BFN. Moreover, it has demonstrated its capability to provide thorough and timely identification and resolution of problems. In NRC Inspection Report 93-04 NRC recognized the timely engineering support provided by system engineers.

11. System Engineer Program Improvements

In the May 8, 1992, self-assessment letter TVA identified several enhancements to the system engineering program on which TVA would be focusing in the upcoming (current) assessment period to bring about improved performance. TVA identified three efforts to achieve this objective: (1) develop backup system engineers for each system (expected completion date - June 1994), (2) increase knowledge level through vendor training (completed in December 1991), and (3) conduct certification training (expected completion date - July 1994).

During the assessment period TVA made good progress toward achieving this goal. TVA has developed backup system engineers for over 80% of plant systems, and expects to complete this program by January 1994. TVA enhanced the component knowledge of system engineers by sending system engineers to vendor facilities for in-depth component training on some of the new components and systems being installed during the refueling outage (e.g., integrated computer system, fire protection upgrades).

During the assessment period TVA established detailed certification.training requirements for system engineers. These requirements include familiarity with design basis information found in the final safety analysis report, technical specification requirements, and detailed system and component knowledge. Using these new requirements, TVA certified an additional 8 system engineers (23 of 57 are now certified), and is on target to complete certification training of all system engineers by July 1994.

In an effort to streamline its functions and improve its working relationship with other organizations, in mid-1992 BFN's system engineering organization conducted a survey of its plant "customers" to identify areas for improvement. Several key areas were identified, including improvements in response time, more support of in-field activities, and the need to understand integrated system response to changes and interactions with other systems ("big picture"). Currently, the system engineering organization is implementing changes to address these issues.

12. Implemented Drywell Leak Detection Procedure

As a result of two voluntary shutdowns in the previous assessment period due to unidentified drywell leakage, TVA has gained valuable experience in the identification of drywell leakage. This, in turn, led TVA to develop a systematic five-part process assist personnel in identifying areas of drywell leakage. The first four parts direct gathering of data through temperature monitoring, leakage into the radwaste sumps, indications from a continuous air monitor in the drywell, and analysis of chemical and radiochemical data. The fifth part analyzes the data gathered to determine suspected leak areas.

Lessons learned were relied upon and incorporated into the development of this instruction. For example, TVA initially had difficulty determining why the radioactivity levels in a reactor coolant sample were sometimes nearly double that found in a sample from the drywell sump. As a result of its shutdown experience, TVA now realizes that the difference in these two radioactivity levels is primarily due to plateout of radionuclides. TVA now uses a 40% plateout figure when analyzing radwaste sump data.

In Inspection Report 92-29, NRC reviewed this procedure and concluded that the procedure provides an integrated approach to determine the source of unidentified drywell leakage.

13. Improvements to Temporary Alteration Program

In the May 8, 1992, self-assessment letter TVA stated that during the upcoming (current) assessment period, TVA would be focusing increased management attention on BFN's temporary alteration program to enhance the program and further reduce the number of temporary alterations. TVA's review of temporary alterations at the POD meeting have been successful in reducing open temporary alterations on Unit 2. Currently, only three remain open, and TVA expects these three to be closed by the end of the refueling outage.

14. Measures Taken to Ensure Fuel Reliability During Unit 2 Cycle 7

TVA has instituted several measures to ensure fuel reliability during the upcoming Unit 2 operating cycle. First, based on indications of potential pinhole leaks observed during the previous operating cycle (Cycle 6), TVA performed vacuum fuel sipping on fuel assemblies which will be reloaded and used during the upcoming fuel cycle. During the fuel sipping, two leaking rods were identified and replaced. Second, TVA will be loading 296 fresh fuel assemblies; 160 of which will be the new General Electric barrier fuel design. These new barrier fuel assemblies feature improvements such as ultrasonic testing of fuel rod end plug welds and improved cladding heat treatment. Third, TVA will be adding new fuel monitoring software during the outage as part of the integrated computer system upgrade. Fourth, the Cycle 7 core has been designed using the Control Cell Core (CCC) concept. The CCC design eliminates the need for frequent control rod sequence exchanges, requires fewer control rod movements, limits control rod movements to a fixed group of control cells, and uses low reactivity fuel around the control cells so that control rod motion occurs adjacent to low power fuel. Finally, during the upcoming operating cycle BFN's Fuel Integrity Assessment Team will continually monitor fuel performance for signs of degradation and make recommendations to minimize any potential effects of the degradation.

15. Management Senior Reactor Operator (SRO) Certification Course

On November 2, 1992, at the direction of the BFN Plant Manager, TVA initiated a detailed training program to improve the knowledge of BFN management personnel. The 18-week program is comprised of 4 weeks of training on reactor and plant fundamentals, 10 weeks of systems training, 4 weeks of simulator training, and 1 week of examinations. Upon completion of the program, participants are awarded a BFN Management SRO Certification. Currently, five Maintenance managers, two Site Engineering managers and a Licensing manager are attending the course. TVA plans to offer this course again during the upcoming assessment period.

16. Simulator Improvements

In this assessment period TVA implemented numerous improvements to the simulator. TVA completed control room design review (CRDR) and integrated computer system (ICS) modifications on the simulator. While implementing the CRDR and ICS modifications, TVA corrected one of the last major physical exceptions to the simulator certification by changing the back panels to their correct location rather than the mirror image of the control room. TVA also replaced essentially all of the wiring and components with new maintenance-friendly components to reduce simulator downtime. In addition, TVA revised the simulator's core model to reflect Cycle 7 fuel characteristics.

In preparation for startup following the outage, and to better familiarize the operators with these changes, on March 1, 1993, TVA began training operators on the new simulator configuration.

Areas for Further Improvement

1. System Engineering Program Enhancements

During the upcoming assessment period TVA will undertake further efforts to improve the system engineering program at BFN. Two primary efforts will involve correcting programmatic and personnel weaknesses identified in the customer surveys (these are discussed in more detail above), and broadening system engineer component knowledge. TVA will also be reducing its dependency on contractors in the systems area.

TVA is also planning to revise some of the system engineer programs to consolidate functions and streamline processes. Specifically, TVA will be focusing efforts to develop a program to trend instrument drift. TVA will also be consolidating multiple programs governing conduct of testing.

2. Engineering Training

In December 1992 TVA identified problems with documenting the training completed by site engineering personnel. These problems occurred due to the cumbersome requirements for documenting completed training. Following identification of the problem, TVA reviewed existing records and determined that personnel had received adequate training on existing requirements. To resolve this issue, TVA is streamlining its process to reduce required documentation. For example, while personnel will continue to review affected procedure changes, they will no longer be required to document review of the insignificant (e.g., editorial) changes. TVA expects to complete this process enhancement by April 30, 1993.

VII. FUNCTIONAL AREA - SAFETY ASSESSMENT/ QUALITY VERIFICATION

Performance in this area was rated as Category 2 and improving in the September 1992 final SALP report. Problems were identified with incident investigations not always identifying the root cause or investigating the full scope of problems, Quality Assurance not always being proactive in identifying problems, poor planning in pursuit of high priority licensing submittals, and difficulties in meeting established schedules. With respect to the latter two weaknesses, the SALP Board recommended that TVA maintain management focus on timeliness of submittals and commitment schedules.

TVA has undertaken corrective actions since the previous assessment period, and continues to aggressively identify measures to further improve performance in this functional area. Details on these measures are provided below.

Major Accomplishments

1. Timeliness of Submittals and Commitments

   In the September 1992 final SALP Report, NRC noted that improvement had been evident in both the quality and timeliness of licensing submittals. Nevertheless, the SALP Board also recommended that TVA continue to focus management attention on the timeliness of submittals and commitments.

   During this assessment period, TVA maintained a high level of performance in these areas. For example, with respect to submittals, during the assessment period only one of 81 submittals was late. The particular late submittal, Licensee Event Report (LER) 259/92005, was submitted one day late due an unanticipated power outage on the day the LER was due. This power outage prohibited the Licensing organization from completing final revisions to the LER.

   Regarding commitments, during the assessment period TVA extended the completion date of only four NRC commitments. Most importantly, however, TVA completed all NRC commitments within the prescribed timeframes (i.e., no late commitments). Throughout the assessment period TVA also maintained management attention on internal commitments and corrective actions.

2. Formation of Nuclear Assurance and Licensing Organization

   On February 16, 1993, TVA combined the BFN Site Quality, Independent Safety Engineering, Licensing, and Operating Experience organizations and formed the Nuclear Assurance and Licensing organization. As a result, the latter three organizations no longer report to the BFN Site Vice President; instead, they report through TVA's corporate organization to the Vice President, Technical Support.

This organizational change is a TVA pilot program with BFN as the lead plant. The purpose of the change is to minimize duplication of efforts and consolidate resources to more effectively accomplish the organization's functions. These changes focus related work activities into a single, cohesive organization. The reorganization also creates a dedicated trending group and strengthens BFN's overall corrective action and trending programs.

Currently, TVA is in the process of transitioning to this new organization. Final implementation of the organization, including necessary program changes required to realign activities and organizational responsibilities, is expected by June 30, 1993.

3. Contractor Organizations Integrated Into TVA's Site Nuclear Assurance Organization

Prior to the above organizational changes, TVA had implemented another reorganization in October 1992. As part of this change, contractor quality assurance organizations, with the exception of General Electric's, were integrated into the BFN Site Quality organization (as discussed above, this organization is now the Site Nuclear Assurance organization). This results in the contractors reporting directly to TVA's Site Quality Manager (now the Site Nuclear Assurance and Licensing Manager). This also results in improved communications, uniformity in work practices, and improved followup of information.

4. Incident Investigation Improvements

Overall, the Incident Investigation (II) process was identified as a strength by NRC during the previous SALP period. During this assessment period TVA continued to support and improve the process with primary emphasis on determining the root cause of events and implementing effective corrective actions to prevent recurrence of events.

TVA emphasizes the use of multi-disciplinary event teams to improve the depth of IIs and to promote consensus on corrective actions. The team roster is established early in the investigation process. For significant events the plant manager approves the team membership; for less significant events the event manager performs this function. This approach provides management an opportunity to ensure proper team expertise and balance prior to proceeding with the main investigatory work.

TVA continued to use the Plant Evaluation Review Panel (PERP) to review significant IIs. This multi-disciplined panel consists of site management personnel from plant disciplines, site support groups, and training; and the Site Human Performance Enhancement System (HPES) coordinator. The panel provides an additional level of management review of the incident, root cause, and corrective actions. This approach ensures the event has been fully explored, corrective actions are appropriate, and provides an active feedback channel for event team managers.

TVA recently modified the II methodology to encourage the individual(s) actually involved in the event to work closely with the event team. This results in obtaining first-hand knowledge of the event and provides a better understanding of the issue, and in some cases, a better understanding of how to correct the problem. This change is consistent with TVA's Total Quality (TQ) Program, which encourages personnel involvement in all aspects of problem solving. The TQ Program is discussed in more detail in the following section.

Another innovative approach to improve the quality of IIs involves the implementation of a self-assessment survey. Survey questionnaires are sent to individual team members following completion of selected event reports. The survey solicits team members' opinions on the overall effectiveness of the II; as well as on specific areas such as appropriateness of the team composition, whether the individual had sufficient time to participate in the II, etc. The results of the surveys are compiled and submitted to the event manager as feedback on the specific report.

More recently, the survey responses have been numerically averaged into a "report card" type rating (excellent, good, fair, etc.,) and the results published in the monthly II trend report. The objective of this effort is to provide a means for event managers to compare their IIs to other event managers' and, thus, encourage better overall reports.

5. <u>Root Cause Analysis (RCA) Training and Problem Solving</u>

A critical element of effective event investigations as well as day-to-day problem solving is the ability to identify the correct root cause of the problem or event, and develop sound corrective actions. Throughout the assessment period TVA continued to ensure personnel are provided with the proper tools to evaluate events and problems by aggressively training site personnel in three major RCA methods.

The first of these methods is INPO's HPES, which teaches change analysis, barrier analysis, event and causal factor charting, and provides special methods to assess man/machine problems and human performance problems. TVA conducted 6 HPES training courses in 1992 and has scheduled 3 more for 1993. Currently, 245 BFN personnel have been trained in this methodology.

The second method is Kepner-Tregoe (K-T) problem solving techniques. This method features rigorous cause analysis methods and a powerful decision making methodology. TVA has provided K-T training to approximately 245 BFN personnel, including many Maintenance managers and foremen. TVA is also providing K-T training to Operations personnel on a selected basis.

The newest RCA training module is a three day problem solving course titled "Tools and Techniques." This course is a key element of TVA's TQ Program and is particularly useful for addressing process related problems. This method is unique in that it is oriented toward both technical and non-technical personnel. TVA conducts monthly Tools and Techniques training courses, and currently has trained over 250 BFN personnel.

An integral part of TVA's TQ program is the formation of quality improvement teams (QITs) which utilize the Tools and Techniques method for problem solving. Two types of QITs are used - functional teams and task teams. Functional teams are voluntarily formed by individual organizations to identify and address problem areas within their organization. Currently there are several functional QITs (some of these have been discussed above in other sections of this enclosure); TVA plans to have 12 teams established by the end of 1993. Task teams are formed to address specific problems identified by management, employee input, or be relevant performance indicators. These teams are usually multi-organizational and are created on an as-needed basis. Team members are selected on the basis of skills related to the problem or process being evaluated.

6. <u>Change in Nuclear Assurance Evaluation Methodology</u>

During this assessment period the Site Nuclear Assurance organization (formerly Site Quality) transitioned from a monitoring program to an assessment process. This new process is management oriented and focused on goals, management controls, and general improvements in efficiency and effectiveness of site programs. The process incorporates an improved methodology which utilizes performance objectives and criteria that are similar to INPO's.

In addition to the adoption of this new methodology, TVA is now encouraging line management to participate in the conduct of evaluations. This provides management with first hand insight into problems and potential problems in their area. Another unique feature of the new methodology is the expansion of the traditional auditing approach to include emphasis on training and coaching of line organization personnel during the evaluation.

TVA implemented use of this new methodology on January 19, 1993, when a pilot evaluation of operations activities was initiated. Since beginning this evaluation, TVA has also initiated a pilot evaluation of maintenance activities.

7. Monthly Assessment Reports

To improve communications and increase site management awareness of assessment activities, TVA developed and implemented a monthly assessment report. Prior to developing this report, BFN's Site Nuclear Assurance organization issued individual monitoring reports of each activity that was observed. This new report compiles and groups individual assessment activities performed during the month into a composite summary of performance in each area. It also includes an overview of the previous month's assessment activities. As a result, this report provides a more accurate picture of performance, problem areas, and potential problem areas.

The Site Nuclear Assurance organization provides this monthly report to the line organizations and conducts monthly meetings with each organization to discuss the report details and future assessment plans. These monthly meetings also provide line management with an opportunity to provide feedback to the Site Nuclear Assurance organization on the effectiveness of the meetings and potential areas for improvement in the conduct of assessments. TVA has developed formal feedback forms to document meeting comments, areas for improvement, and other items of interest.

The final element in the new monthly report process is individual monthly follow-up meetings with the BFN Plant Manager, Engineering and Modifications Manager, Site Vice President, and NRC Senior Resident Inspector. During these meetings performance in all functional areas is discussed and overviewed. The development of this monthly report has greatly enhanced the ability of the Site Nuclear Assurance organization to identify and communicate problems in the early stages of development, which results in more timely problem resolution.

8. Quarterly Nuclear Assurance Self-Assessments

On June 26, 1992, TVA completed development of a standardized evaluation methodology for conducting self-assessments of the Site Nuclear Assurance organization. This new methodology has been incorporated into a standard procedure to be used by TVA's nuclear plants and corporate office. The standard procedure became effective September 25, 1992.

This evaluation methodology utilizes performance objectives and specifies criteria to meet each objective. Pursuant to this procedure, a TVA-wide team of Nuclear Assurance personnel from TVA's nuclear plants and corporate office evaluates BFN performance in predetermined criteria each quarter, and will evaluate all criteria over the four-quarter cycle. These quarterly self-assessments identify strengths, weaknesses, and opportunities for improvement, as well as action plans, with specific action items and completion dates, to address weaknesses or deficiencies. TVA completed the first quarterly self-assessment of BFN on January 31, 1993.

9. Site Nuclear Assurance Staff Qualification Upgrades

Throughout the assessment period TVA has continued to take steps to improve the qualification of Site Nuclear Assurance personnel. One of these steps involves expansion of rotating assignments by rotating an individual from the Site Nuclear Assurance organization into the Modifications organization. TVA had previously initiated these rotating assignments by assigning a licensed senior reactor operator to the Site Nuclear Assurance organization. These rotating assignments broaden the experience and knowledge level of Operations and Modifications personnel, and also provide them with a new perspective and renewed appreciation for Site Nuclear Assurance personnel. In addition, the rotating assignments give Site Nuclear Assurance personnel a corresponding new perspective on and first-hand understanding of operations and modifications activities.

Another step TVA has taken is the certification of three additional evaluators as lead auditors, which now provides BFN with a total of seven certified lead auditors. TVA is also providing observational training for Site Nuclear Assurance personnel. This training teaches effective observation techniques and their use; how to prepare and conduct observations; how to establish communications with personnel being observed; and follow-up and reporting techniques.

10. Quality Control (QC) Refueling Outage Support

During this assessment period TVA initiated a temporary reorganization of the QC organization to better support the refueling outage. This change involved establishing planning, coordination and problem solving groups to support QC lead inspectors (lead inspectors are assigned to each shift to coordinate inspection activities, interface directly with line management, and be the focal point of the QC inspection effort).

The planning group provides work scope information and implementation schedules to the lead inspector to enhance his knowledge of upcoming work. The coordinating group coordinates activities to maintain awareness of activity scope, schedule, and QC support requirements. Coordinators within this group provide recommendations to the lead inspectors regarding QC support. The problem solving group consists of senior inspectors responsible for providing timely resolution of field problems and recommending process enhancements. These efforts, in conjunction with improved communications with implementing organizations, have resulted in efficient and effective QC support of refueling outage activities. To date, no significant delays have occurred as a result of lack of QC support.

11. Inspector of the Day Program

In the previous assessment period TVA implemented an innovative change in inspection techniques through development of the "Inspector of the Day" program. During this assessment period TVA continued to utilize this program.

In this program, an inspector within the QC organization is assigned daily to monitor different plant areas for actual problems or potential problems in areas such as safety, fire protection, combustible loading and housekeeping. The inspector performing this function compiles written reports of his observations, and reports problems and potential problems directly to Site Nuclear Assurance management, senior plant management, and the manager responsible for resolving the condition. This provides both Nuclear Assurance and line organization management with real time information regarding performance.

This program has resulted in prompt resolution of identified problems and potential problems. TVA also performs monthly evaluations of the results of these inspections to identify repetitive problems or areas of the plant that are consistently weak. The results of this monthly evaluation are also provided to Site Nuclear Assurance management as well as senior plant management.

Areas for Further Improvement

1. Technical Specification (TS) Amendment Request Process Improvements

During the assessment period 5 of 28 BFN TS amendment requests submitted to NRC have required supplementing (2 of the 5 were submitted prior to the beginning of the assessment period). As a result, TVA recognizes the need for improvement in this area. Therefore, during the upcoming assessment period TVA will continue to focus attention on improving the quality of BFN's TS submittals.

In this regard, TVA has already initiated several efforts to improve BFN's TS submittal process. These include performing additional reviews of submittals prior to issuance, developing and implementing a submittal review checklist, adding improved database search capabilities, and conducting attention to detail sensitivity training for licensing engineers.

2. Incident Investigation (II) Process Enhancements

As discussed above, during the assessment period TVA implemented several process improvements to BFN's II program. During the upcoming assessment period TVA will be implementing additional enhancements to further improve performance in this area.

The first enhancement involves increased focus on the evaluation of human performance problems. TVA is currently revising the procedure for conducting IIs to place additional emphasis on the human element during evaluation of plant events. The need for this increased emphasis is due to a general shift from hardware failures to human performance problems as the cause for most plant events. This decline of hardware problems can be attributed to improved operating and maintenance programs over the last several years.

A companion effort to increasing emphasis on the human element is proper training. As discussed above TVA has made a considerable commitment to train personnel in INPO's HPES methodology. Currently 245 employees have been trained in HPES methods and additional training is scheduled this year. Fifty percent of II event managers are HPES trained and TVA plans to increase this to 90 percent in 1993. TVA is also performing an evaluation to determine the feasibility of replacing BFN's current root cause trend codes with INPO causal factor codes. Use of causal factor codes allows a better stratification of personnel performance problems for analysis and trending.

A second planned improvement is the incorporation of a post-implementation effectiveness review of II corrective actions to verify the actions actually achieve the desired results in the field. This post-implementation review will be performed on a selective basis primarily for II corrective actions which require an experience period to show effectiveness.

TVA is also emphasizing evaluation of previous in-house and industry experience when dispositioning new events. TVA recently revised the process for researching previous events and experience information to be more specific with respect to the types of experience that should be evaluated (e.g., maintenance history, INPO databases). TVA will continue to monitor the effectiveness of this change during the upcoming assessment period.

3. <u>Nuclear Assurance Performance Enhancements</u>

During this assessment period TVA established a self-assessment team to survey Site Nuclear Assurance and interfacing organizations to determine the functions a Site Nuclear Assurance organization should and should not be performing, and also what functions could be improved. This survey was conducted to identify significant problems, identify means to establish better communications with management, and identify areas for improvement.

Following completion and evaluation of this survey, TVA identified problems with Site Nuclear Assurance's problem solving, communications with other organizations, and awareness of their role and/or effectiveness. As a result of this effort, TVA established two QITs to review current practices, identify customer needs, and address recommendations for improvement. TVA expects to complete implementation of recommendations by September 1993.

4. Trend Analysis

As discussed above, one of TVA's objectives for reorganizing site organizations and forming the Nuclear Assurance and Licensing organization was to integrate site trend analysis processes and create a dedicated trending group. As part of this effort, TVA formed a team to improve the standardization and utilization of trend data throughout the TVA nuclear power program. The first phase of this effort will provide input on integrating INPO cause codes into trend and barrier analysis. TVA expects to complete this by June 1993. The second phase will involve developing and implementing an improved method for analyzing trends, including use of statistical data modeling. TVA expects to implement this second phase in late 1993.

5. Utilize Nuclear Safety Review Board (NSRB) Personnel During Scheduled Audits

TVA will be implementing measures in the upcoming assessment period to strengthen NSRB's involvement with, and overview of, BFN line organizations. TVA intends to accomplish this by utilizing NSRB members during scheduled audits. This will enhance the technical expertise of the audit team, and increase the direct involvement of NSRB members in site activities.

6. Coordination and Consistency of QC Field Criteria Implementation

During the assessment period TVA experienced problems coordinating QC support with line organizations, and also with the inconsistent application of the criteria QC utilizes for interfacing with the line organizations. This led to some problems with scheduling QC resources to support the line organizations.

In the upcoming assessment period, TVA will be focusing its efforts to resolve these problems. TVA is considering establishment of additional rotating assignments with site organizations to improve the interface with these organizations (as discussed in more detail in Item 9 above, rotating assignments had previously been initiated). Expansion of these rotating assignments would bring a broader experience base to the QC organization, help QC personnel better understand the needs of the implementing organization, and help the line organizations better understand the needs of QC. This should also improve the coordination between QC and the line organization, and minimize work delays.

In addition, TVA will be standardizing training and qualification requirements for TVA and contractor QC personnel. This should improve the consistency of field inspections by QC personnel.

7. Utilization of Lessons Learned for Assessments

In the upcoming assessment period TVA will strive to identify new measures to improve the effectiveness of its assessment process by improving the collection and prioritization of industry information, and by improving the prioritization and retrieval of internal information. TVA's current process for retrieving information is not user friendly and requires inordinate amounts of time to gather information to prepare for audits and assessments. TVA is currently simplifying the process by upgrading computer hardware and software to improve the ease and timeliness of data retrieval.

ENCLOSURE 2

Tennessee Valley Authority

Browns Ferry Nuclear Plant (BFN) Unit 2

Systematic Assessment Of License Performance (SALP)

May 24, 1992 - June 19, 1993

Self-Assessment

List of Commitments

1. TVA will present to NRC, prior to implementation, the advanced radiation worker training program being developed to improve worker practices, and increase individual worker responsibility and accountability.

2. TVA will initiate a rotational assignment between the Modifications organization and the Site Nuclear Assurance organization. TVA expects to complete this action by September 24, 1993.

3. TVA will conduct training for Maintenance personnel to emphasize the importance of ensuring that in-field work scope growth is identified, properly documented in the work order package, and that proper post maintenance testing requirements are specified. TVA expects this training to be completed by June 17, 1993.

4. TVA will conduct off-hours staff augmentation drills for each of the three emergency response teams. TVA expects to complete these drills by December 31, 1993.

5. TVA will revise its training programs for emergency response personnel to emphasize the importance of coordination and communication between the Technical Support Center, Operations Support Center, control room, and in-plant emergency response teams. TVA expects to complete this training by October 22, 1993.