ENCLOSURE

INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-260/92-18

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY UNIT 2

FROM MAY 24, 1991 THROUGH MAY 23, 1992

TABLE OF CONTENTS

I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) program is an integrated Nuclear Regulatory Commission (NRC) staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance on the basis of this information. The SALP program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocation of NRC resources and to provide meaningful feedback to the licensee's management regarding the NRC assessment of their facility's performance in each functional area.

The previous SALP appraisal period was from January 3, 1989 to March 31, 1990 while the plant was recovering from a five year shutdown. In accordance with NRC policy, the SALP process was suspended since Browns Ferry was a Category 3 plant on the problem plant list. On April 23, 1991 the Commission granted approval to restart. The SALP process was reinitiated when the plant achieved criticality on May 23, 1991.

An NRC SALP Board, composed of the staff members listed below, met on July 7, 1992, to review the observations and data on performance and to assess licensee performance in accordance with Chapter NRC-0516, "Systematic Assessment of Licensee Performance."

This report is the NRC's assessment of the licensee's safety performance at Browns Ferry Nuclear Plant for the period from May 24, 1991, through May 23, 1992.

The SALP Board for Browns Ferry Unit 2 was composed of:

A. Gibson, Director, Division of Reactor Safety (DRS), Region II (RII), Chairman
J. Johnson, Acting Director, Division of Reactor Projects (DRP), RII
B. Mallett, Deputy Director, Division of Radiation Safety and Safeguards (DRSS), RII
F. Hebdon, Director, Project Directorate II-4, Nuclear Reactor Regulation (NRR)
B. Wilson, Chief, Reactor Projects Branch 4, DRP, RII
T. Ross, Senior Project Manager, NRR
C. Patterson, Senior Resident Inspector, DRP, RII

Attendees:
C. Julian, Chief, Engineering Branch, DRS, RII
D. McGuire, Chief, Security Section, DRSS, RII
P. Kellogg, Chief, Reactor Projects Section 4A, DRP, RII
H. Whitener, Reactor Inspector, DRS, RII
J. Potter, Chief, Facilities Radiation Protection Section, DRSS, RII
R. Shortridge, Radiation Specialist, DRSS, RII
W. Sartor, Emergency Preparedness Specialist, DRSS, RII

Attendees (cont.):
G. Kuzo, Senior Radiation Specialist, DRSS, RII
J. Williams, Project Manager Browns Ferry Unit 3, NRR

II. SUMMARY OF RESULTS

Overview

During this 12-month assessment period, Browns Ferry Nuclear Plant demonstrated continuing improvement in performance. Improvements in the areas of Plant Operations, Maintenance/Surveillance, Emergency Preparedness and Safety Assessment/Quality Verification as well as strong performance in Radiological Controls enabled Unit 2 to consistently operate in a safe manner with relatively few equipment or operational problems.

Continued improvement was noted in the Plant Operations area with few operational errors. Strong management attention, emphasis on personnel performance, and simulator training before infrequently performed evolutions aided plant operations in excelling.

Browns Ferry continued to demonstrate excellent performance in the area of Radiological Controls. The As Low As Reasonably Achievable (ALARA) initiatives remain a program strength. ALARA goals have been met and new lower goals established. An aggressive program for reduction of contaminated areas has reduced the total contaminated areas to 3%. A source term reduction program and a new computerized radiation exposure tracking system were noted as improvements in this area.

Improvements were noted in the Maintenance/Surveillance area especially in backlog management and material condition of Unit 2. The maintenance supervisory development program was implemented and management attention directed to reduce personnel errors. Management attention to the area of configuration control is still needed.

The Emergency Preparedness program was maintained at a high level. There were no program weaknesses noted in the most recent exercise. Management attention to this area is evidenced by the procurement of a radiological emergency preparedness van for environmental monitoring and by a critical self assessment program.

Continued improvements are being made in the site Security Program. During this period the licensee has implemented the use of new detection equipment, procured new weapons and completed the clean up of the spent fuel pools to allow for improved accountability of special nuclear material. Upgrades of the site perimeter detection system, access portals, and access control systems were in progress at the end of the assessment period.

The Engineering/Technical Support area received several program enhancements. These included improvements in the design control process which tracks the modification to completion and requires all documentation to be correct before closure. The process by which the licensee contracts out modification work was implemented during the period of this report. Additional attention is needed in this area to ensure that adequate control of contractors is maintained. Onsite design engineers and a strong system engineering group provided excellent support to plant operations and maintenance.

Performance in the Safety Assessment/Quality Verification area continued to improve. The incident investigation process is considered to be a strength. Continuing management attention is needed to ensure the quality of the reports is maintained. The backlog of late reports and overdue corrective actions has been significantly reduced by an aggressive effort on the licensee's part. Root cause analysis training has provided significant improvements in the quality of the licensee's reports. Some additional improvement is needed in planning and scheduling of licensing submittals and meeting commitment dates.

Overall, the licensee's performance has been excellent. This is exemplified by the higher ratings in four SALP functional areas. All areas showed some improvements. Management's strong commitment to excellence is being impressed on all levels of the plant staff with good results.

Performance ratings assigned for the last assessment period and the current period are shown below.

Functional Area	Rating Last Period	Rating This Period
Plant Operations	2 (SD)*	1
Radiological Controls	1	1
Maintenance/Surveillance	3, Imp	2
Emergency Preparedness	2, Imp	1
Security	2	2
Engineering/Technical Support	2	2
Safety Assessment/Quality Verification	3, Imp	2, Imp

* Shutdown (SD)

III. CRITERIA

The evaluation criteria which were used, as applicable, to assess each functional area are described in detail in NRC Manual Chapter 0516. This Chapter is in the Public Document Room files. Therefore, these criteria are not repeated here, but will be discussed in detail at the public meeting held with the licensee management on July 27, 1992.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

This functional area addresses the control and performance of activities directly related to operating the units, as well as fire protection.

Strong operational philosophy and control were displayed after the unit was restarted. Initial criticality was performed in a controlled and methodical manner. Each licensed operator brought the reactor critical during training which was conducted for several days at the beginning of the power ascension test program (PATP). Effective on-shift communications and control of plant evolutions contributed to successful completion of the PATP without an automatic trip. However, a manual reactor trip was initiated due to exceeding torus water temperature limits while operating the Reactor Core Isolation Cooling System (RCIC). The torus temperature limit was exceeded due to operator inexperience in not recognizing the need for torus cooling to be placed in service while operating the RCIC system for an extended period of time. The NRC maintained 24 hour coverage of operations for two months during the PATP with inspectors, supervisors and contractors. A high level of expertise of the plant operating crews was noted by these NRC observers.

Shift staffing for plant operation was a strength. In addition to staffing required by Technical Specification (TS), three additional Senior Reactor Operators (SRO) (one Shift Support Supervisor and two Outside Assistant Shift Operating Supervisors) were maintained.

Significant improvement was noted in the response to plant annunciators. Alarms were verbally called out and repeat acknowledgements used. Alarms in test or maintenance were identified by annunciator window labels. The number of lit or disabled annunciators was very low and often zero.

Following the power ascension test program, Unit 2 experienced three automatic and one manual reactor trip during this assessment period. The automatic trips were attributed to equipment failures. Plant operators handled each of the automatic trips properly. Prior to each plant startup and plant maneuver, operations crews were given additional training on the plant simulator. In addition, the post trip reviews conducted by the plant operations review committee (PORC), and the incident investigations were comprehensive and self critical.

An operator error occurred during a controlled plant shutdown. The main generator exciter field breaker was not opened as required resulting in an operator tripping the reactor due to a number of unexpected equipment responses. As a result of this, additional training was given to operating crews on the simulator before the next planned shutdown. A shutdown for a maintenance outage was later conducted without difficulty indicating an ability to implement lessons learned.

Close coordination and effective communication between departments were displayed in the plan of the day meetings. Operations' control and influence have helped to achieve effective planning and scheduling of plant evolutions. This led to a lack of significant problems during the PATP. The operational influence was further expanded by placing a licensed SRO into the Quality Assurance (QA) organization, work control group, outage planning, and other departments. Members of operations management were assigned to provide shift coverage during outages until the unit was returned to power operation.

The outage planning conducted during an eight day maintenance outage was a strength. TVA effectively implemented the NUMARC guidelines for risk reduction during outages. Outage meetings were conducted several times a day.

Problem areas were identified in independent verification, labeling, and attention-to-detail. Ineffective independent verification failed to identify improper fuse replacement in a diesel generator (DG) control circuit. Labeling problems resulted in two violations. A drywell blower breaker was found labeled on two different electrical boards. One of the locations was a spare. An auxiliary plant operator pulled the wrong fuses during a routine tagout. Problems associated with Primary Containment Radiation Monitor three pen recorders and incorrect chart paper recurred due to ineffective corrective action.

Strong management support of operator training continued to be evident. All candidates passed initial licensing exams given in June and December 1991. The plant simulator was upgraded and certified during this period.

TVA maintained a dedicated professional fire protection section with a fire truck located inside the protected area of the site. The fire protection program remained the responsibility of a single designated manager in the Operations Department. Overall reviews of the program by the NRC found the program to be maintained in conformance with regulatory requirements, Technical Specifications, and industry guides and standards. TVA promptly reviewed the generic applicability of problems in fire protection at another licensee facility and concluded that similar problems

did not exist. Fire protection systems and equipment installed for protection of safety-related areas were functional and tested in accordance with requirements specified in the TS. Fire protection training was comprehensive. Definitions of fire watch duties were clarified to insure compliance with TS. TVA effectively tracked Appendix R and TS fire protection Limiting Conditions for Operation (LCOs) during plan of the day meetings. Improvements were noted in labeling of Appendix R equipment and compensatory fire hose station. The ability to quickly and effectively respond to plant fires was demonstrated through training drills and minor events in the plant. A TS required fire watch was not maintained after fire wrap was removed from operable residual heat removal service water pump power cables in the intake structure. Although this activity was performed by Unit 3 personnel, a contributing factor to this problem was separate operations work control centers for Unit 3 and Unit 2.

Six Violations were issued.

2. Performance Rating

Category: 1

3. Board Recommendations

None.

B. Radiological Controls

1. Analysis

This functional area addresses those activities directly related to radiological controls, radioactive waste management, environmental monitoring, water chemistry, and transportation of radioactive material.

Overall, the radiation protection program continued to aggressively control personnel exposure to radioactive materials and protect the health and safety of the plant personnel and the public.

Management oversight and support were effective. The fiscal year (FY) 1992 ALARA goals were included in management performance standards. The ALARA/Radwaste Committee (ARC) was restructured to be chaired by the Plant Manager or Site Vice President. The ARC revised the 1991 FY exposure goal downward from 650 person-rem to 539 person-rem and met this more challenging goal. Management used planned power reductions to save dose. Five power reductions, for maintenance activities, were done solely for ALARA purposes with an estimated savings of 24 person-rem. For example

power reductions were done for condenser waterbox cleaning, identification of condenser air inleakage, and for repair of feedwater heater steam leaks.

TVA was aggressive in maintaining occupational radiation exposures ALARA. Special subcommittee approvals for ALARA Planning Reports (APR) were required when exposure goals exceed 5 person-rem for a job. APRs that exceed 50 person-rem required Corporate ALARA Committee approval. A formal review was conducted on all APRs at 25%, 50%, 75% and job completion. ALARA awareness training modules were designed and implemented for chemistry, engineering, and planning. A hot spot tracking, trending, and reduction program was aggressive in identifying approximately 75 hotspots and eliminating approximately 25 by flushing or shielding. Approximately 30 hotspots were listed in inaccessible areas. One hundred and twenty two temporary shielding packages were installed in Unit 3. This reduced general area dose rates by approximately 40%.

TVA has taken other steps to reduce dose in the plant. To reduce decontamination time, TVA used metal scaffolding in the radiologically controlled area (RCA). Chemical decontaminations were completed in the Unit 3 recirculation system (average radiation dose rates were reduced from 192 mR/hr to 23 mR/hr). TVA reduced the radiation dose source term by decontamination of the fuel pool cooling heat exchangers for all three units, conducted a Unit 3 reactor water cleanup system chemical decontamination, removed approximately 35,000 curies of irradiated hardware from the three spent fuel pools, and compacted and removed stored control rod blades.

TVA initiated several actions to improve the control of radiation exposure around the site. TVA implemented an automated control of access and tracking of exposures via the radiation exposure system (REXS). As a result of TVA's efforts to control dose, the collective doses were less than planned for 1991 and 1992 through March 1992. For example, the goal for 1991 was 539 person-rem and the actual was 507 person-rem. TVA also reduced the surface contamination area to less than the percentage last assessment period. The number of personal contamination events were less than the goals for 1991 and 1992 through March 1992.

Licensee staffing levels were adequate with a strong base of experience within the radiation protection area and radiochemical areas. Technician certification by the National Registry of Radiation Protection Technologists was encouraged and 30 have been certified.

Audits were a program strength. Audit reports were probing, indepth, well-planned, documented and performed by qualified, and

knowledgeable auditors. During this assessment period, TVA performed audits in the areas of radiological effluents, the Offsite Dose Calculation Manual, the Process Control Manual, environmental monitoring, and radioactive materials management. The findings and observations were of low safety significance and had been adequately addressed by TVA's technical staff.

TVA's program to control and quantify radioactive effluents was effective. There were no unplanned radioactive releases that required reporting to the NRC. Although the quantities of radioactive material released in both liquid and gaseous effluents increased significantly over the previous assessment period, the lower levels of activity released during the previous years reflected that the units had been shut down since 1985. The estimated potential doses to the public due to the release of liquid and gaseous effluents for calendar year 1991 were well below the dose limits specified by the Technical Specifications and the environmental dose limits specified in Federal regulations.

TVA's effluent monitoring system was effectively maintained and system operability had improved since the previous assessment period. Since the beginning of this assessment period, there were no airborne or liquid radiological effluent instrumentation monitors on Unit 2 inoperable for periods greater than allowed. There was one instance where TVA's staff did not recognize a potential for inadequate sampling due to the design and installation of the constant air monitor sampling system for the reactor, refueling floor, and turbine building ventilation systems.

TVA's program for monitoring and controlling chemistry parameters was effective. TVA had adopted the Electric Power Research Institute (EPRI) guidelines for chemistry control. Through TVA's aggressive management of chemistry water quality, power ascension rates to ensure fuel integrity, and administratively limiting recirculation flow, TVA has been able to maintain excellent fuel integrity, to date, and maintain reactor coolant contaminants within EPRI guidelines.

Prior to Unit 2 restart, TVA completed installation of the post accident sampling system (PASS) to satisfy the requirements of NUREG-0737. During this assessment period, the PASS was evaluated during plant operating conditions and met the criteria specified in NUREG-0737.

TVA had a good quality assurance program for inplant radiological analyses as described in NRC Regulatory Guide 4.15. TVA recognized the need for closer management review of vendor

laboratory results to address problems that arose with the measurement of radiostrontium nuclides. The vendor was audited by TVA and the analysis results for strontium nuclides were nearly twice the known values. Licensee results for gamma measurements of samples split with the NRC showed good agreement for all sample types.

TVA's program for processing, packaging, storing and shipping radioactive solid wastes was effective. There were no shipping violations during this assessment period. The technicians who performed radioactive waste shipments were adequately trained and performed their duties competently. Daily solid waste generation was reduced through aggressive management attention and the bulk material permit program which limits the material entering the radiation controlled area.

2. Performance Rating

Category: 1

3. Board Recommendations

None

C. Maintenance/Surveillance

1. Analysis

This functional area addresses those activities related to equipment condition, maintenance, surveillance performance, and equipment testing.

During this assessment period the maintenance department provided effective continuity while being significantly reorganized on two occasions. One reorganization was to support the Unit 2 recovery effort. TVA transitioned from a period of intense activities preparing for the restart, supporting the PATP, and settling into an operational mode of maintenance activities. The second reorganization was to support the Unit 3 recovery effort, which included controlling activities through a contractor, ensuring adequate maintenance work completion on Unit 3 systems, and preparations for returning systems to operable status. Also affecting this second reorganization was the start of preparations for the upcoming Unit 2 refueling outage.

The plant material condition of equipment during this assessment period was good especially considering the plant had not operated for seven years. Five significant equipment related problems occurred which resulted in three reactor scrams and two forced

outages, but these problems were not caused by maintenance deficiencies. One of the scrams was due to a failure of a soldered joint in an air line. The second scram occurred when a fuse in the switchyard system blew causing a turbine trip and a reactor scram. The third scram occurred when the feedwater control system failed and resulted in a reactor scram due to low reactor water level. Both forced outages were due to increases in drywell unidentified reactor coolant system leakage.

The housekeeping and cleanliness of the Unit 2 operating spaces were good. TVA continued with an aggressive program of cleaning and painting Unit 2 and common plant areas. This included machinery, machinery spaces, stairwells, hallways, and air locks.

The preventative maintenance (PM) program was very effective throughout this assessment period. The program was significantly upgraded during the extended outage. A dedicated group monitored and maintained the program. The ongoing status of performed PMs, outstanding PMs, and upcoming PMs were discussed at the morning maintenance management meeting. The effectiveness of the PM program was evident due to the high availability of equipment. The number of late PMs over the last six months of this period was approximately one per month. Throughout this assessment period system engineering performed component failure analysis and the maintenance PM group submitted items for trending to the system engineers. The criteria for a failure trending analysis were very strict and were adhered to by the PM group. During the later part of the assessment TVA commenced shifting to a reliability-centered maintenance approach.

Actions taken to correct equipment and procedural deficiencies were not always effective. For example, the majority of trouble shooting activities to correct excessive fluctuation in recirculation flow were aimed at the electrical/electronic control system while the probable cause was mechanical misalignment. This was discovered, after six months and numerous problems, when the scoop tube positioning arm bolt sheared off. Proper mechanical alignments in accordance with vendor requirements were performed on both motor generator sets correcting the problems. One item that continued to be a problem was the number of the times that the diesel generator (DG) start system air compressors were placed in the inoperable status due to head gasket failures. System engineers were continuing to review this item in order to find a final solution.

Another example was identified in the performance of a DG surveillance. A section of the Surveillance Instruction (SI) dealt with a partial restoration of equipment and change to the test alignment in order to perform a check of a subsystem. Restoration of equipment was not performed as described by the

procedure and an unplanned DG start occurred. An additional weakness was identified when follow up by licensee management did not address the DG tripping on overspeed.

Training for the maintenance group continued to be generally strong. Training consisted of the use of mockups for various equipment such as motor operated valves, high pressure coolant injection (HPCI) turbine, circuit breakers, and control rod drive pumps and motors. Early in the assessment period a significant event occurred which in part involved an inadequate procedure and a lack of operational philosophy at the craft level. A mechanical craftsman defeated the interlocks on the primary containment personnel access airlock doors and opened both doors while the reactor was critical. It was later determined that the procedure for controlling this activity was inadequate. This event also indicated that management had been ineffective in conveying their operational philosophy down to the craft levels. Partially as a result of this event and other indications of a lack of teamwork, TVA completed a six week offsite training course for maintenance supervisors and this program appeared to be effective. It consisted of team work building, supervisory techniques, and personal interactions. This resulted in improved teamwork within the maintenance supervisory organization. The staffing levels for the craft were adequate in that important work items were not significantly delayed due to a lack of craftsmen or maintenance support personnel.

Management attention in the area of the maintenance backlog was evident as the backlog was greatly reduced and maintained at a low level. This was achieved in part as a result of the extended outage. TVA's taking advantage of forced outages to maintain a low backlog was considered a strength in this area.

The procurement process was well managed with no significant parts or component problems. The process was most effective during the forced outages. Procured items were available when needed and last minute needs were satisfied. The expediting process was effective. This was evident during the design initiation and the modification installation of the generator-to-grid protective system logic change.

Post maintenance testing and post-modification testing performance was good. Testing activities included testing following a significant modification on the generator to switchyard protection logic. This was accomplished using input from the design engineering group and was performed as a separate activity from the modification installation. Each work order, generated by planning, clearly indicated the post maintenance testing required. These post maintenance tests were either written specifically for

the work activity or referenced an already existing procedure and consistently demonstrated equipment capability.

Effective work planning was accomplished by the maintenance organization. This included all work activities associated with corrective maintenance, non-corrective maintenance, and the PM program. The task of scheduling the work was assigned to the operations organization. Effective work planning and scheduling were evident when a valve in the Unit 2 shutdown cooling system located in the drywell started to leak. This prompted licensee management to shutdown Unit 2 prior to reaching the technical specification limit for unidentified leakage and make repairs. The repair group used the corresponding valve in the Unit 3 drywell as a mock up in order to better organize the Unit 2 repairs. The planning for this activity was excellent.

The surveillance program performance throughout this assessment was generally very good. This was demonstrated by the restart, core physics, power ascension and inservice inspection surveillance and testing. These tests, which involved Operations, Engineering, and Technical Support personnel were well planned, controlled by adequate procedures and performed by knowledgeable personnel essentially on schedule and without significant problems. Test frequency and results met all regulatory requirements. All TS required surveillances were completed on time. A noteworthy performance by the Reactor Engineer in the control room during a high pressure coolant injection system operational test is an example of this achievement and is further discussed in the Engineering/Technical Support Section of this report. The status of surveillance tests was discussed at the POD with Senior Management. Test alignments were properly reviewed for train operability considerations and appropriate action statements were followed.

TVA has continued to have problems with the three methods used to ensure correct system lineups (self checking, second party verification, and independent verification). Corrective action taken during the preceding period was not effective in preventing additional problems in this area. Although improvements have occurred during the assessment period, the NRC has identified several examples of TVA's failure to take prompt effective action to correct identified deficiencies in this area. Examples of problems identified include failure to perform independent verification as required during surveillance testing resulting in unintentional isolation of a pressure transmitter for six days, failure to perform adequate independent verification while replacing fuses or restoring equipment to operable status when releasing equipment clearances, failure to perform independent verification step by step as required during performance of a diesel generator surveillance, and failure to perform required

second party verification prior to the performance of a critical step during radiation monitor surveillance testing resulting in an unplanned refueling floor ventilation system isolation.

One weakness was noted in maintenance interface with Unit 3. Contractors performed safety related work on a secondary containment penetration when not authorized to do this activity.

Four violations were issued during the assessment period. One violation was a Severity Level 3 for the containment doors, with three examples. One Deviation was also identified.

2. Performance Rating

Category: 2

3. Board Recommendations

System alignment methods need to be reviewed to ensure the proper level of control is applied and confusion as to the use of the proper method is resolved.

D. Emergency Preparedness

1. Analysis

This functional area addresses activities related to the implementation of the Emergency Plan and procedures, support and training of onsite and offsite emergency response organizations, licensee performance during emergency exercises and actual events, and interactions between onsite and offsite emergency response organizations during exercises and actual events.

Good management support for emergency preparedness was evident throughout the period. For example, management supported 1) a computer based tracking system for monitoring emergency response training; 2) obtaining a new upgraded radiological emergency preparedness (REP) van for environmental monitoring; 3) the administrative program governing the distribution of Emergency Plan Implementing Procedures (EPIP) changes to controlled copy holders; 4) and independent audits by corporate staff.

TVA demonstrated good preparation for dealing with site emergency situations during a full participation exercise in October, 1991. During the exercise TVA demonstrated they could implement the Emergency Plan and its implementing procedures, assign emergency response organization responsibilities, and could take suitable actions to mitigate the onsite and offsite consequences of accidents. Emergency classifications were prompt and correct as the scenario progressed and operations of the emergency response

facilities and equipment observed during the annual exercise were good. TVA challenged response personnel through the use of mock ups for realistic performance of repair activities. TVA's self critique was aggressive, well-organized and identified substantive issues needing correcting. Two key issues were the poor coordination and communications between the operational support center and in plant repair teams and the audibility of the public address system.

TVA continued to maintain in a state of readiness the basic emergency preparedness elements needed to identify promptly, classify correctly, staff sufficiently, and implement effectively the Emergency Plan and its procedures in response to emergency events. TVA's facilities and equipment to respond to an emergency, including the Technical Support Center, the Emergency Operations Facility, and Communications equipment were well maintained. TVA conducted drills to test the availability and timeliness for staff to man the response facilities. As a result of one of these drills, TVA self-identified areas needing correction to improve timely staffing of the facilities.

During the assessment period, TVA declared five notifications of unusual events and all events were classified correctly and promptly. TVA responded promptly and appropriately to a transportation event that occurred late in the assessment period.

No exercise weaknesses or violations were identified during the assessment period.

2. Performance Rating

Category: 1

3. Board Recommendations

None

E. Security

1. Analysis

This functional area addresses the adequacy of the Security Program to provide protection for plant vital equipment and special nuclear material (SNM) as required by licensee commitments and regulatory requirements. The scope of the assessment included licensee activities associated with access control, physical barriers, detection and assessment, armed response, alarm stations, power supply, communications, and compensatory measures. In addition, the area addresses TVA's Fitness for Duty Program.

During the assessment period some improvements in security program effectiveness were apparent as a result of the completion of the interim security program upgrade initiated by TVA to comply with established commitments for Unit 2 restart. Included was the reduction in the size of the protected area that decreased the number of required compensatory patrols, replacement of malfunctioning turnstiles with electronic card key controlled doors at vital portals, and modifications to the perimeter intrusion detection and assessment systems. The actions to date have contributed to improved effectiveness of access control hardware and armed response.

During this assessment period, TVA identified weaknesses in access control. One was the permitting of two terminated contractor employees to enter the plant. A second was a vital portal that was unalarmed and unattended in excess of one hour. TVA had a prior history of access control problems of the first type which were outside this review period. This access control problem was under review by the NRC at the end of the period.

The security organization was adequately staffed and trained to perform duties related to access control, detection and assessment, armed response and compensatory measures. The security training program provided adequate training and qualification in the areas of equipment, security system utilization, and procedural requirements as demonstrated by security personnel performance.

Strong support of the security program by corporate and site security management remained evident as demonstrated by the commitment and funding of a major upgrade of the security system, the recent procurement of new hand-held detection equipment to be utilized in the access portals, and the transition to semi-automatic handguns and rifles. Management took actions to improve the operational effectiveness of the security program and enhance personnel performance. Authority was delegated to shift supervisors with encouragement to participate and be actively involved in the management of the security program.

An aggressive audit program contributed to the identification and correction of security-related issues and problems which were tracked and trended with followup accomplished to ensure that effective corrective action was implemented. Lessons learned from the audits were disseminated to the security staff to preclude recurrence.

The effectiveness of corrective actions in the Safeguards Information Program, in which several violations were identified

during the previous assessment period, was confirmed by the absence of further recurrence.

The coordination and management of security plan revisions continued to be satisfactory. TVA submitted two revisions to the Physical Security Plan during this assessment period. The revisions were timely, accurate and well coordinated with the Regional staff.

There were improvements in TVA's program for control and accountability of special nuclear material (SNM). Initially, progress in the completion of corrective actions for several violations relating to accountability and inventory of SNM was slow and all corrective actions associated with SNM accountability were not completed in a timely manner. As a result, midway into the current assessment period, TVA identified SNM in the spent fuel pool that was not included on previous inventories.

TVA's Fitness for Duty Program functioned effectively during this assessment period and compliance with the objectives of a drug-free work place were demonstrated. TVA took adequate corrective actions to eliminate the contributing factors to previously identified problems. Both procedural practices and facilities were improved.

Two violations were issued during this assessment period. One of the violations was a Severity Level 3 for control of special nuclear material.

2. Performance Rating

Category: 2

3. Board Recommendations

The board recognizes management's commitment to installing the system hardware upgrades. The board recommends that management continue to monitor the quality and timeliness of the installation of these upgrades.

F. Engineering/Technical Support

1. Analysis

This functional area addresses those activities associated with the design of plant modifications; engineering and technical support for operations, maintenance, outages, testing and surveillance; and operator training.

During this assessment period, engineering and technical support activities were satisfactory relative to administration of design control, documentation and modifications.

Design controls were generally effective. Design control procedures were upgraded to reflect the lessons learned through the Design Baseline and Verification program and a design engineering group was established onsite to improve the effectiveness of engineering functions. An upgraded Design Change Notice (DCN) closure process tracked modifications to completion and assured that all documentation, including drawings, were changed to reflect modifications before closure.

The quality of design modification and temporary design change packages was acceptable. The modification packages contained adequate documentation of post modification testing, 10 CFR 50.59 safety evaluations, material procurement, and interfacing between design development and installation responsibilities. One area where the design control process was not fully successful was licensee control of contractor activities. Several violations, one deviation and a licensee issued stop work order had occurred in this area since August 1991 concerning contractor performance of design work without authorization, failure to update a primary drawing, and failure to observe Unit 2 - Unit 3 separation and access control requirements. Although these items were related to Unit 3 design activities, they affected Unit 2 support systems. An additional example where the design control process was not fully successful concerned the constant air monitoring (CAM) system. The effects of sharp bends in the sample piping and sample probes that did not meet ANSI recommendations were not thoroughly evaluated prior to system installation.

Primary drawing discrepancies, which were identified as a weakness in the previous assessment period, were well controlled in this assessment period. Primary drawings are those maintained in the control room which are necessary for plant operations. All known discrepancies in primary drawings were corrected prior to restart. Subsequently, two isolated instances of failure to update primary drawings were identified: one due to the inadvertent cancellation of a field change request to correct reversed wiring from drywell radiation monitors to control room recorders and one due to inadequately controlled contractor design work on the 4Kv cooling tower switchgear C loop.

Engineering oversight and involvement in plant operations were good this assessment period. Representatives interfaced with management and other engineering groups in plan-of-the-day meetings and interfaced effectively with oversight committees such as the Management Review Committee and Plant Operations Review

Committee. Improved engineering involvement in day to day operations resulted in effective support for plant operations. An example of prompt problem analysis and design modification was observed in the resolution of the HPCI pump trip on low suction pressure during fast start. The problem was resolved by installation of a time delay in the trip circuitry. Another example of engineering support for operations included the on-line correction of the air leakage into the drywell, which created an oxygen concentration problem.

The timeliness and quality of engineering support in the maintenance area were generally good. For example, timely engineering support was observed during repair of leaking valves in the Unit 2 drywell. A Technical Specification waiver placed a rigid time limit on the repair. When the job could not be performed as planned, engineering provided a resolution to the problem and the job was completed within specified time limits. Good engineering support was also evident in materials control when analysis of fasteners, which were slightly out of specification, showed the fasteners could be used in the planned application with a large safety margin. One engineering problem not resolved in a timely manner was the control room emergency ventilation system which functions outside its design specification. Engineering has considered the problem but the corrective action commitment date has been extended.

System engineers continued to be a strength. The system engineer assumed ownership of his system and was active in identifying and resolving problems, performing routine system walkdowns, recommending design changes, and performing system tests. Additionally, the system engineer took the lead in incident investigations for his assigned system. One problem identified in a system walkdown concerned the analog trip units (ATUs) which indicate main steam line high flow. Certain ATUs were intermittently activating due to process noise. Power was reduced to stabilize the units, data was taken for an engineering evaluation and a modification was developed to resolve the problem. During installation of the modification the system engineer recognized that continuing work could potentially result in the loss of Technical Specification required function. Work was stopped, work instructions revised, and the job successfully completed. Another example where a system walkdown was effective was the identification of several interferences due to thermal expansion.

System engineers also contributed effectively to the success of the Power Ascension Test Program. For instance, during a HPCI operability test, the reactor engineer in the control room constantly monitored core thermal limits and other core performance parameters. He made accurate predictions of reactor

response to the transient and anticipated the data and analysis requirements of the shift supervisor and the test personnel. Additionally, overview test briefings were performed for each oncoming shift and an indepth, thorough, detailed briefing was performed prior to each test. These briefings were considered a strength in the technical support area.

TVA maintained an adequate engineering staff. The onsite engineering staff for Unit 2 was approximately 300 technical personnel. Within the engineering group 18 design engineers were dedicated to plant operation support. The remaining staff was considered adequate to perform the ongoing modifications following Unit 2 restart and the post restart items.

TVA continued to strengthen the system engineer program through the process of certification and backup system engineer programs. These programs involved considerable system, classroom and simulator training. Additionally, system engineers were periodically rotated to different systems to broaden their skills.

Engineering and management support for the motor operated valve (MOV) testing and surveillance program were generally satisfactory. Strong cooperation between corporate and onsite engineering groups; knowledge of MOV technical issues and state-of-the-art diagnostic technology; involvement in industry issues; and well documented, technically thorough engineering reviews and calculations were considered engineering strengths in this program. Positive management involvement was evident by the staffing level and resources allocated to the program.

An effective licensed operator training program was demonstrated by a 100% pass rate on two initial examinations (23 operator candidates). Additionally, there was a 100% pass rate for the Generic Fundamentals Examination Section, which continues the high level of performance in this area. Quality examination material was provided. Thorough pre-reviews of the NRC initial examinations were made, as evidenced by no post examination comments by the facility on either examination that was administered.

TVA's developmental guidelines for upgrading the Emergency Operating Instructions (EOIs) to conform with Revision 4 of the approved BWROG Emergency Procedure Guidelines (EPGs) were reviewed by the NRC and found to be acceptable. Also, the guidelines for conducting verification and validation were well structured and contained sufficient detail.

TVA completed a major upgrade of the plant-referenced simulator and certified this training and evaluation tool to the NRC as meeting the requirements of ANS-3.5, 1985 in December 1991. This

effort concluded a significant improvement in the facility's ability to provide relevant, quality training and evaluation to licensed operators and operator candidates.

One violation was issued during the assessment period.

2. Performance Rating

Category: 2

3. Board Recommendations

The board recognizes TVA's efforts to control contractors. The board recommends that close monitoring of the contractors be enhanced to ensure adequate control continues.

G. Safety Assessment/Quality Verification

1. Analysis

This functional area addresses those activities related to implementation of safety policies; amendments, exemptions and relief requests; response to Generic Letters, Bulletins, and Information Notices; resolution of safety issues; reviews of plant modifications performed under 10CFR 50.59; safety review committee activities; and the use of feedback from self-assessment programs and activities.

During the assessment period several plant modifications and program changes enhancing plant safety were completed. Hardware changes included HPCI pump suction low pressure trip logic circuity changes, addition of main generator field breaker auto trip, addition of Residual Heat Removal shutdown cooling suction valve interlock, and addition of redundant switchyard trip relays. Significant program changes included improved switchyard access control, improvements to TVA's incident investigation process, and changes to TVA's program for management of outage activities based on recent NUMARC initiatives.

The Nuclear Safety Review Board (NSRB) was active on current issues at the site. The members were well informed on emerging issues at other utilities and often asked probing questions of the plant staff.

Several significant strengths were noted during the power ascension test program. The foresight of senior TVA management to supplement the plant staff with experienced GE test engineers, improve secondary plant material condition, and implement lessons learned from other utility test programs was noteworthy.

Site management attention and support for resolving significant technical and safety issues were almost always evident. Important decisions were consistently made at appropriate levels to ensure sufficient management review had taken place. Corporate management was frequently involved in site activities. At any given time, both TVA management and plant personnel regularly demonstrated a comprehensive grasp of the complex technical and safety issues that affected plant performance.

Staffing of onsite and corporate licensing personnel was ample, as evidenced by TVA's ability to meet its regulatory responsibilities and maintain control over the backlog of licensing actions. The experience and competence of TVA's licensing staff remained a strength throughout the SALP period. Technical and engineering support of licensing activities, both in expertise and staffing, was more than adequate. On those occasions when TVA employed the services of outside contractors/consultants, they were generally used to augment inhouse capabilities.

One of the most significant improvements was in the implementation of TVA's corrective action programs. This was evident by the programmatic upgrades in the handling of identified safety significant issues, improvements in the tracking and assurance of timeliness of addressing identified problems, and an increased level of attention by management in the review of Conditions Adverse to Quality (CAQ) documents. TVA continued to reduce the number and improve the timeliness of outstanding open corrective action items. The number of open Conditions Adverse to Quality went from 81 at the beginning of the SALP period to 54 at the end of the period. The number of action items (a single corrective action document involved one or more action items) that became late during May 1991 was 25. Based on increased management attention in this area, that number continued to decrease until in April 1992 only 2 action items were late.

TVA's reportability threshold and root cause determinations were conservative throughout the SALP period. Additionally, noticeable improvements occurred in TVA's incident investigation program. These included requiring an evaluation for human performance factors for more significant events involving personnel errors and reduced time frames for more significant events. Although much management attention went into this program, completed final event reports did not always identify the actual root cause or cover the full scope of the problem. An example of this was the unplanned "1A" D/G automatic start that occurred on December 18, 1991, which failed to mention the engine overspeeding which also occurred during the event. Another example included an incident investigation associated with failure to update primary drawings for the 4160V Loop following closure of a design change in a timely manner resulting in configuration problems and an incorrect

assessment of electrical loads. The final event report for this failed to identify the correct root cause. Additionally, an example of missing information in a LER (50-260/91-09) was identified during the SALP period.

TVA's efforts to enhance plant safety during outage activities were evident by improved switchyard access controls and various changes to TVA's program for management of outage activities. Outages were well planned and conducted with proper sensitivity to shutdown risk. These changes were based on recent NUMARC initiatives intended to improve plant safety. The main emphasis was to maximize the availability of safety related equipment above the minimum required by the Technical Specifications and to minimize station activities during critical evolutions.

Quality Assurance was not always proactive in identifying problems. Several problems in licensee programs were not identified by TVA prior to NRC inspections. Examples of these were the control of contractor activities involving the removal of fire wrap from operating equipment and configuration control problems. Improvements were noted in better communications between managers, supervisors, and the staff; improved management teamwork at the site; and increased attention by senior TVA management toward improvement of the Condition Adverse to Quality programs.

Improvement has been evident in both quality and timeliness of licensing submittals. TVA's responses to Generic Letters (GLs) and regulatory reporting requirements were almost always timely, complete, and technically accurate. Only twice during the SALP period did TVA fail to provide a timely response (GL 91-11 and 10 CFR 54(w)); and once provided incorrect information (ERDS). These examples were isolated occurrences, that were appropriately dispositioned. Furthermore, TVA's responses to regulatory initiatives and requirements consistently demonstrated a clear understanding of the technical issues involved and were occasionally proactive (e.g. expanded IPE and hardened vent).

TVA continued to exhibit instances of poor planning in their pursuit of high priority plant specific licensing actions needed to support plant operations or anticipated outage work. Examples of these instances, where inadequate planning by TVA resulted in unnecessarily exigent evaluations by NRC, included: ASME Code Case N-491, HVAC Seismic Criteria, certain Technical Specifications (TS) amendments (TS-299 and TS-295), and an exemption from 10 CFR 50 Appendix J.

The technical approaches used by TVA in their submittals were consistently sound, thorough, and reflected appropriate

conservatisms from a safety and regulatory perspective. In a limited number of cases the technical content of TVA's submittal was incomplete or ambiguous (Status of Post- restart commitments and Drywell Steel Seismic Criteria). On these, and other, occasions where further clarification and/or additional information was warranted, TVA's responses were timely and complete. In general, the quality of TVA submittals was high.

Communication between TVA and the NRC staff was excellent. Channels for exchanging information were constantly open and routinely exercised at all levels of TVA and NRC. Conference calls and meetings were regularly used by TVA and the staff to effectively expedite the progress of licensing actions. TVA frequently conducted special meetings to brief new staff reviewers on the extensive history and background of specific licensing actions.

TVA continued to experience difficulty in meeting established schedules. TVA failed to achieve many of its own scheduled commitment dates for supporting important licensing activities. TVA usually notified the NRC of any impending slippage in its commitment schedules, and subsequently negotiated acceptable alternatives. The commitment tracking program was generally effective. However a negative trend in the timely completion of commitments and resolving of potential Part 21 issues was identified during the SALP period. Examples of this were delays in resolving concerns associated with safety relief valve acoustic monitor card and Rosemount transmitter problems and extending the resolution of the Control Room Emergency Ventilation System design.

Unit 3 interface activities and control of contractor activities was a weaknesses. Although a unit separation program existed, examples were identified that indicated contractors did not understand personnel access requirements. Also, subcontractors were not adequately controlled and supervised in the field. Licensee management did not ensure these activities were properly authorized prior to work beginning.

Two Violations were issued in this area.

2. Performance Rating

Category: 2 Improving

3. Board Recommendations

The board recommends that TVA keep management attention focused on timeliness of submittals and commitment schedules.

IV. SUPPORTING DATA

A. Major Licensee Activities

Unit 2 began the assessment period on May 24, 1991 by going critical following a seven year shutdown. The Unit was placed on the grid on June 27, 1991 and completed the Power Ascension Test Program (PATP) on August 6, 1991. No unplanned automatic trips were received during the PATP. One manual trip associated with the torus temperature was performed during the period. During the assessment period there were three unplanned shutdowns due to equipment failures and two planned shutdowns for repair of drywell leakage. During each of the shutdowns, TVA has performed corrective maintenance and local leakrate testing. At the end of the period, Unit 2 was operating at full power.

Management and/or organization changes instituted by TVA during the assessment period included:

Mr. John Scalice replaced Lew Meyers as Plant Manager.

Mr. Dan Nauman resigned as the Senior Vice President Nuclear. His position is currently vacant.

Mr. Jon Rupert was named as the Engineering and Modifications Manager.

Mr. R. Baron was moved to Licensing Manager replacing P. Carier who was moved to Total Quality Manager.

Mr. Chris Crane was moved to Maintenance Manager replacing Allen Sorrell who was moved to Programs Manager.

Mr. Allen Brittain was named as the Site Security Manager.

Major modifications for the unit completed in this assessment period include HPCI pump suction low pressure trip logic circuity changes, addition of main generator field breaker trip, RHR shutdown cooling valve interlock, and addition of redundant switchyard trip relays. Work is ongoing for the Control Room upgrade and preparations for the next refueling outage which is scheduled for January 29, 1993.

The Post Accident Sampling System was declared operational during the period.

B. Major Direct Inspection and Review Activities

During this assessment period 38 routine and 2 special inspections

were conducted by resident and regional-based inspectors. This included major inspections to assess TVA's MOV program and the electrical distribution system. Fourteen meetings were held with licensee management including 2 enforcement conferences associated with containment integrity and control of special nuclear material.

Twenty four hour coverage of plant operations was conducted by the NRC and contractors from May 24 to August 6, 1992. This corresponds to the initial criticality through the PATP.

C. Escalated Enforcement Action

1. Orders

NONE

2. Civil Penalties

$75,000 Civil Penalty and Severity Level III for failure to maintain primary containment while critical by leaving drywell doors open during power ascension testing.

3. Severity Level III, No Civil Penalty, for control of special nuclear material.

D. Licensee Conferences Held During Appraisal Period

6/10/91	Corrective Actions for drywell incident
7/12/91	Enforcement Conference on loss of primary containment integrity
8/28/91	Final seismic design criteria for structural steel
9/6/91	Multi-unit individual plant examinations
9/24/91	Upgrade of EOIs to revision 4 of BWROG EPGs
10/4/91	Enforcement conference on control of special nuclear material
11/20/91	Type B & C primary containment leak tests required by Appendix J
1/23/92	HVAC seismic design criteria
2/4-6/92	Audit of HVAC seismic design criteria
2/21/92	Plant status
4/17/92	TVA SALP assessment of Unit 2 performance
4/30/92	Use of ductility ratios in analyzing thermal growth of steel structures
5/7/92	Plant status
5/19/92	Appendix R safe shutdown analysis approach for multi-unit operation

E. Confirmation of Action Letters

NONE

F. Review of Licensee Event Reports (LERs)

During the assessment period, a total of 17 LERs were analyzed. The distribution of these events by cause, as determined by the NRC staff, is as follows:

Cause	Unit 2 & COMMON
Component Failure	6
Design	3
Construction, Fabrication or Installation	0
Personnel Error	
- Operating Activity	3
- Maintenance Activity	3
- Test/Calibration Activity	2
- Other	0
Other	0
Total	17

Note 1: With regard to the area of "Personnel Error," the NRC considers lack of procedures, inadequate procedures, and erroneous procedures to be classified as personnel errors.

Note 2: The "Other" category is comprised of LERs where there was a spurious signal or a totally unknown cause.

Note 3: The above information was derived from a review of LERs performed by the NRC staff and may not completely coincide with TVA's cause assignments.

G. Licensing Activities

During the assessment period, NRC completed 25 TVA licensing actions (LAs) for Unit 2 (not including Task Interface Agreements). Of these LAs, four were license amendments, two were ASME Section XI relief requests, and two were post-TMI action items (SPDS and DCRDR). The volume of LAs processed for Unit 2 dropped dramatically (down 60%) during this SALP period when compared to the previous 12 months. However, this was an expected consequence of the effort by TVA and NRC to eliminate the Unit 2 backlog prior to restart.

H. Enforcement Activity

FUNCTIONAL AREA	NO. OF VIOLATIONS IN SEVERITY LEVEL			
	NCV	IV	III	DEV
Plant Operations	1	6		
Radiological Controls	1			
Maintenance/Surveillance	4	3	1	
Emergency Preparedness				
Security	1	1	1	
Engineering/Technical Support	1	1		
Safety Assessment/ Quality Verification	1	2		
TOTAL	9	13	2	

I. Unplanned Shutdowns & Reactor Trips

Date	Cause	Type
6/29/91	High Torus Temp	Manual
9/14/91	Partial Loss of Feedwater (Air Line)	Automatic
10/18/91	Drywell Leakage Repair (Reverse Power)	Manual
12/18/91	Failed Fuse Generator Protection	Automatic
2/23/92	Shutdown to Repair Drywell Leakage	Manual
4/27/92	Feedwater Controller Failure	Automatic