

TENNESSEE VALLEY AUTHORITY

NUCLEAR POWER

BROWNS FERRY NUCLEAR PLANT

DESIGNED TO OPERATIONAL READINESS REVIEW (ORR)

RESPONSE TO

OPERATIONAL READINESS REVIEW

PHASE TWO REPORT

BROWNS FERRY UNIT TWO

SEPTEMBER 10, 1990

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ACRONYMS AND ABBREVIATIONS

ALARA - As Low As Reasonably Achievable
ANI - American Nuclear Insurers
ASME - American Society of Mechanical Engineers
ASOS - Assistant Shift Operations Supervisor
AUC - Assistant Unit Operator
BFW - Browns Ferry Nuclear Plant
BOP - Balance of Plant
BWR - Boiling Water Reactor
BWROG - Boiling Water Reactor Owners Group
CAQ - Condition Adverse to Quality
CI - Chemical Instruction
CRD - Control Rod Drive
CSSC - Critical Systems, Structures, and Components
ECCS - Emergency Core Cooling System
ECN - Engineering Change Notice
ECP - Estimated Critical Position
EPI - Electrical Preventive Instruction
EPRI - Electric Power Research Institute
ESF - Engineered Safety Feature
FY - Fiscal Year
GE - General Electric Company
GOI - General Operating Instruction
HCU - Hydraulic Control Unit
HPCI - High Pressure Coolant Injection
IE - Inspection and Enforcement

ACRONYMS AND ABBREVIATIONS (Continued)

IGSCC - Intergranular Stress Corrosion Cracking
INPO - Institute of Nuclear Power Operations
MMI - Mechanical Maintenance Instruction
MPAC - Maintenance Planning and Control
MR - Maintenance Request
N/A - Not Applicable
NE - Nuclear Engineering
NER - Nuclear Experience Review
NIC - Noinstant Change
NMRG - Nuclear Managers Review Group
NRC - Nuclear Regulatory Commission
NSRB - Nuclear Safety Review Board
NUREG - Nuclear Regulatory Commission Regulation
OER - Operating Experience Report
ORR - Operational Readiness Review
OSHA - Occupational Safety and Health Administration
OSIL - Operations Section Instruction Letter
PM - Preventive Maintenance
PMI - Plant Manager Instruction
PMT - Post Maintenance Testing
RADCON - Radiological Control
REP - Radiological Emergency Plan
RHR - Residual Heat Removal
RHRSW - Residual Heat Removal Service Water
RSCS - Rod Sequence Control System

ACRONYMS AND ABBREVIATIONS (Continued)

EVWL - Reactor Vessel Water Level
EWM - Rod Worth Minimiser
SCI - System Calibration Instruction
SDSP - Site Director Standard Practice
SER - Safety Evaluation Report
SI - Surveillance Instruction
SIL - Service Information Letter
SOER - Significant Operating Experience Report
SOS - Shift Operations Supervisor
SPAE - System Plant Acceptance Evaluation
SPDS - Safety Parameter Display System
SPOC - System Preoperability Checklist
SQN - Sequoyah Nuclear Plant
SRM - Source Range Monitor
SRO - Senior Reactor Operator
STA - Shift Technical Advisor
STD - Standard
TI - Technical Instruction
TROI - Tracking and Reporting of Open Items
TVA - Tennessee Valley Authority
UO - Unit Operator

A. INCONSISTENT ACHIEVEMENT OF EXPECTED STANDARDS OF EXCELLENCE

1. Concern

Inconsistencies existed in the degree to which high standards of excellence were being achieved.

Response Summary

We believe the OER team's observations support our position that general improvements have been made in the conduct of operations and maintenance activities. Our task now is to establish a uniform standard of performance for all site activities. The management and organizational structures are in place to accomplish this goal. Each of the items below will be monitored routinely by plant management to ensure consistent performance. Additionally, the BFN trend reports monitor overall performance.

2. Basin

- A. Some shift turnover meetings were conducted very well with clear, loud announcements and with participation encouraged. Others, while covering the required subjects, did so in such a pro forma, low key manner that a clear understanding of material presented was not assured.

RESPONSE/ACTION PLAN

The importance of consistency is continually reinforced during each Shift Operations Supervisor (SOS) meeting. Turnover meetings were specifically addressed as an agenda item at the scheduled SOS meeting on April 20, 1990.

The Operations Management Observation Check Program includes checklist items to ensure formally documented periodic assessments of the shift turnover are conducted by Operations managers. A uniform level of consistency is presently being noted through this program and by other observations by Operations management who routinely attend turnovers. Additionally, Operations managers who attend the shift turnover meetings are providing prompt feedback directly to individual SOS's when their performance warrants.

Operations considers this action complete but will continue with observations and will address any inconsistencies which might develop with existing staff or new personnel who participate in turnovers.

Responsible Organization
Operations

Due Date
Complete

A. INCONSISTENT ATTAINMENT OF EXPECTED STANDARDS OF EXCELLENCE (Continued)

2. Basia (Continued)

- b. Performance of personnel in the Shift Operations Supervisor (SOS) and Assistant Shift Operations Supervisor (ASOS) positions during the simulator exercises indicated widely varying standards. More detail is provided in another concern (Item # 7) on Simulator Training within this report. In general, those not assigned regular shift positions were less rigorous than the regularly assigned crew.

RESPONSE/ACTION PLAN

Operations has developed an instruction identifying the responsibilities and standards for expected conduct of Operations personnel while in simulator training. This instruction has been reviewed by Operations personnel who train on the simulator beginning with the current training cycle (started June 23, 1990). Use of this instruction will ensure a consistent direction, and management monitoring of performance will ensure a consistent approach.

Responsible Organization
Operations

Due Date
Complete

- c. Standards maintained in the Operations Support Center showed considerable variation. In some instances, review was minimal, e.g., the requirements for tagging were determined largely from the response of the maintenance personnel involved; Maintenance Requests (MRs) were closed without apparent review of Post Maintenance Testing (PMT). In other cases, review of work scope, tagging, and possible impact on the plant were thorough prior to authorizing work.

RESPONSE/ACTION PLAN

The topic of proper standards will be revisited with the Shift Operations Supervisors at each SOS meeting as well as with all management including ASOSs at weekly staff meetings. Operations Support Center activities were discussed at an SOS meeting to ensure that each SOS understands the standards in this important work area and to identify any obstacles which prevent consistent implementation from occurring. Additionally, we have upgraded the qualification of OSC personnel and have increased management oversight of their activities.

A standardized tagout method for repetitive maintenance activities is scheduled to be developed following the next upgrade of the MPAC work control system.

A. INCONSISTENT ATTAINMENT OF EXPECTED STANDARDS OF EXCELLENCE (Continued)

2. Basic (Continued)

c. (Continued)

Refer also to the discussion in the response to Concern J of this report concerning implementation of the new maintenance planning and work control process.

Responsible Organization
Operations

Due Date
Complete

- d. Considerable variation was noted in the quality of instruction in classroom training periods. While only a few classes were monitored, performance varied from excellent preparation and presentation to a mediocre grasp of the subject and routine following of the lesson plan. In one instance, the instructor was so unfamiliar with the subject that he could not answer trainees' questions.

RESPONSE/ACTION PLAN

In one of the classes observed by the ORR team, a relatively new instructor was teaching "lessons learned" from a Sequoyah event and had difficulty responding to detailed questions related to Sequoyah systems. Consideration had been given to using a Sequoyah instructor for this type of presentation, but was not considered feasible for a two-hour lecture once a week for six weeks. This is not a typical case.

To ensure consistently good instruction, instructors are evaluated by major annual evaluations, frequent walk-in evaluations, and student/instructor evaluations.

Operations management routinely audits classroom presentations and instructor performance, and provides feedback to Training in accordance with Nuclear Training Instruction NT 2.920, "Instructor Training." The frequency of these audits has been increased to ensure at least two audits per week.

Responsible Organization
Training

Due Date
Ongoing

- e. Response by members of management to industrial safety concerns, in one case, was the statement "we don't come under [Occupational Safety and Health Administration] OSHA," as opposed to others expressing concern for providing a safe worker environment.

A. INCONSISTENT ATTAINMENT OF EXPECTED STANDARDS OF EXCELLENCE (Continued)

2. Basis (Continued)

c. (Continued)

RESPONSE/ACTION PLAN

This item is discussed in the response to concern 0, basis item 1.

2. The Operations Management Observation check program requires two observations per week by non-shift operations managers. Only one had been performed in the past three months. Most of the observations required of on-shift managers (SOS/ASOS) have been performed. While many of the observations performed included meaningful comments, some appeared superficial.

RESPONSE/ACTION PLAN

The Operations Management Observation Check program has been inconsistently implemented in recent months. In order to help ensure consistency, this program has been proceduralized as an Operations Section Instruction Letter. This provided the necessary guidance as to the frequency of the observation and the items to be checked. It also indicates responsibilities for implementation and administration of the program. The program has recently been revised and given new emphasis. Non-shift Operations management personnel are scheduled for two observation checklists per week. The checklists are being performed with a high degree of regularity. This program is periodically reviewed to ensure that appropriate areas of concern are being stressed. Additionally, the Operations Superintendent reviews and signs all observation check sheets.

Responsible Organization
Operations

Due Date
Complete

- g. During maintenance on a reactor feedwater turbine, internal parts were left uncovered and disassembled parts were scattered on the floor. On the other hand, the High Pressure Coolant Injection (HPCI) pump turbine, which was left in a disassembled state while awaiting parts delivery, had all exposed parts wrapped and protected.

A. INCONSISTENT ATTAINMENT OF EXPECTED STANDARDS OF EXCELLENCE (Continued)

2. Basis (Continued)

g. (Continued)

RESPONSE/ACTION PLAN

At the time of the ORR evaluation, the Turbo-Generator Coordinator and the maintenance foreman learned of this concern and performed an assessment. The feedwater pump work was judged as not being up to current maintenance standards. The parts on the floor were reorganized and all feedwater exposed parts were covered at the end of each shift to keep parts clean.

The foreman involved and his general foreman have been counselled concerning proper ways to store and handle disassembled equipment and parts. They were also reminded that BOP equipment and disassembled parts are stored and handled with the same care as safety-related items.

A maintenance Peer Evaluation Program was developed and implemented for trial use on May 1, 1990 with full implementation on June 15, 1990. This program is under the direction of the Maintenance Production Manager. The program is being used to define clear and concise standards of workmanship and work quality, and is also used as a learning tool to further promote high standards of excellence.

The maintenance Peer Evaluation Program has been field tested and the program itself is acceptable. Corporate Nuclear Maintenance will provide assistance to conduct individual field evaluations using the BFN program. These individuals will hold immediate follow-up meetings with foremen, general foremen, and craftsmen to review performance and suggest improvements. A similar approach was used to review maintenance documentation and was very effective in improving the quality.

Responsible Organization
Maintenance

Due Date
October 15, 1990

- h. While the dictate to follow procedures was well known and followed generally, there were still instances of non-compliance.

RESPONSE/ACTION PLAN

Procedural compliance has been and will continue to be emphasized throughout all aspects of operations and work processes. Various trend reports indicate this message is being embraced by site personnel. The threshold for incidents has been lowered using the category four incident investigation report. Personnel errors are also being routinely monitored using the Personnel Error Monthly Evaluation Report.

A. INCONSISTENT ATTAINMENT OF EXPECTED STANDARDS OF EXCELLENCE (Continued)

2. Basis (Continued)

h. (Continued)

These actions have been effective in reducing the rate of personnel error and also provide a mechanism to flag to management areas needing further attention.

- i. During observation of a Radiological Emergency Planning Training Drill, the team noted training benefit was only obtained when the Plant Manager was present. He was the only manager or drill observer present who provided constructive criticism and coaching. When the Plant Manager left the control room, overall performance declined (e.g., communications, command and control) and criticism/coaching was not given.

RESPONSE/ACTION PLAN

Drill controllers and management observers have been instructed to provide on-the-spot performance feedback to drill participants during training drills. A number of drills have been conducted since this concern was identified. Performance has improved substantially as noted by the Nuclear Managers Review Group in their review of this concern during August 1990.

Responsible Organization

Radiological Emergency Preparedness

Due Date

Complete

B. SHUTDOWN FROM POWER OPERATIONS TO COLD SHUTDOWN

1. Concern

The plant procedure for unit shutdown and cooldown places the unit in a condition requiring very careful operator action to ensure the reactor remains shutdown during plant cooldown. Industry experience indicates that events distracting the operators during such a shutdown could result in an inadvertent criticality.

2. Basis

- a. The procedure for plant shutdown/cooldown (GOI-100-12A) has been revised to eliminate a reactor scram from about 30 percent power as the normal means of plant shutdown. This change was made to reduce the number of scrams and associated transients.
- b. The procedure requires normal shutdown by fully inserting all control rods per a rod program which requires notch insertion of many rods. Cooldown, up to 90°F/hr, is permitted to start as soon as the reactor is subcritical. A precaution is included to coordinate the cooldown with rod insertion to prevent inadvertent criticality.
- c. The Institute of Nuclear Power Operations (INPO) has identified an incident at a Boiling Water Reactor (BWR) in which an inadvertent criticality occurred while conducting such a shutdown. INPO noted the difficulty in balancing the effects of rod insertion, heat removal, decay heat generation and xenon poisoning in this condition.

RESPONSE/ACTION PLAN (Basis items a - c)

Operations management has reviewed the Limerick event as discussed in INPO Operating Experience Report OE-3148 and INPC Case Study 89-007 as related to the plant shutdown procedures (2-GOI-100-12A and 2-GOI-100-12C). It has been concluded that forced cooldown of the reactor should not begin until all control rods have been inserted. The procedures will be changed to reflect this decision.

Responsible Organization
Operations

Due Date
September 30, 1990

B. SHUTDOWN FROM POWER OPERATIONS TO COLD SHUTDOWN (Continued)

2. Basis (Continued)

- d. Adequate training of operators for such a shutdown may be difficult as INPO noted that the simulator for the plant discussed above could not duplicate the event. The current BFN restart training program does not include simulator training for such a shutdown.
- e. The plant shutdown/cooldown sequence should provide adequate margin against inadvertent criticality without undue operator burden. Startup simulator training should address this evolution.

RESPONSE/ACTION PLAN (Basis items d and e)

As stated in the response to items a - c above, the procedure will be revised to specify that forced cooldown should not begin until all control rods are inserted. This eliminates the need for incorporating the above mentioned shutdown method into restart training or the simulator.

Initial startup training for the licensed operators has just been completed for a six-week cycle. During this cycle, the simulator exercises involved startup from a cold, xenon-free, subcritical condition through closure of the generator breaker. After breaker closure, some of the planned startup tests were also performed to familiarize the operators with the power ascension tests. Another six-week cycle is currently scheduled on the simulator to perform additional startups, tests, etc., prior to unit 2 startup.

Responsible Organization
Operations

Due Date
December 4, 1990

C. RESOLUTION OF INDUSTRY ISSUES

1. Concern

Evaluation of industry-wide technical issues for applicability to BFN, in some instances, had not been conducted in sufficient depth.

Response Summary

The review of technical issues affecting the plant was previously divided between technical support engineering and maintenance engineers. This tended to reduce the effectiveness of technical reviews since overall responsibility was not always clear and technical expertise was in different organizations. This maintenance engineering function has been transferred to technical services thus consolidating technical knowledge and review accountability within a single organization. The development and implementation of the system engineering organization is providing a centralized organizational basis with the skills and knowledge necessary to ensure a detailed technical assessment of past and new technical issues.

2. Basis

The ORR Team endorses the use of generic approaches to issues developed by owners groups, and other organizations as part of a systematic evaluation of technical issues. However, the following examples indicated that BFN may be too willing to accept generic solutions without independent challenge and critical review:

- a. The Nuclear Regulatory Commission (NRC) IE Bulletin 88-04, Potential Safety-Related Pump Loss, requested licensees to investigate and correct, as applicable, two miniflow design concerns. The first concern involved the potential for the dead-heading of one or more pumps in safety-related systems that have a miniflow line common to two or more pumps or other piping configurations that do not preclude pump-to-pump interaction during miniflow operation. The second concerned the adequacy of the installed miniflow capacity for a single pump in operation. The original BFN evaluation of these concerns appeared limited. Specifically:

- (1) For the Residual Heat Removal (RHR) and Core Spray pumps, the TVA response indicated that adverse pump-to-pump interactions would not be expected. This conclusion was apparently based on a generic review by General Electric Company (GE). However, as evidenced by differences in susceptibility to this problem between the two Sequoyah Nuclear Plant units due to individual pump flow characteristics, site specific evaluations appear necessary. Unit specific calculations were not on file and the ORR Team could not confirm their existence.

C. RESOLUTION OF INDUSTRY ISSUES (Continued)

2. Basis (Continued)

a. (Continued)

- (2) The bulletin also required licensees to evaluate the adequacy of the minimum pump flow during miniflow operation. The bulletin indicated that miniflow lines have traditionally been designed for 5 percent to 15 percent of pump design flow and that some pump manufacturers now are advising that pumps should have minimum flow capacities of 25 percent or more for extended operation to protect against hydraulic instability or impeller recirculation problems. For BFN, RHR and Core Spray miniflows of about 6 percent and 10 percent respectively were calculated. The file did not contain vendor agreement with the acceptability of these flow rates and the time spent in the miniflow mode.

The ORR Team noted that simultaneously and independently, the BFN Nuclear Experience Review group had requested a reevaluation of the BFN response to the bulletin in the light of the Sequoyah experience.

RESPONSE/ACTION PLAN

As a general policy we believe an active involvement with vendors and owners groups is healthy and beneficial for TVA. We agree, however, that results and conclusions based on external evaluations must be carefully assessed for applicability to Browns Ferry's configurations and systems.

Corporate as well as site personnel worked together in preparing the BFN response to IE Bulletin 88-04. The BFN response was based both on the results of the Boiling Water Reactor Owners Group (BWROG) Interim Response to Bulletin 88-04 and an assessment of the applicability to our individual plant configuration. The BWROG report was prepared by General Electric (GE). BFN participated in the BWROG effort and had input into the report. The BWROG report concluded that for pump configurations where two pump's minimum flow lines converge into one line that is controlled by a single valve, if the pump characteristics were such that a relatively small change in discharge pressure resulted in a large change in flow, there is potential to deadhead the pump with the lower shutoff head. It also concluded that for cases where the individual lines are orificed, and the pressure drop in the common line downstream is a small part of the overall hydraulic resistance, there should be little pump-to-pump interaction. Browns Ferry's RHR and Core Spray Systems minimum flow lines are individually orificed and the miniflow bypass calculations show that the line losses in the common downstream line are a small part of the overall hydraulic resistance. This was stated in the plant specific information section of the response to NRC Bulletin 88-04.

C. RESOLUTION OF INDUSTRY ISSUES (Continued)

2. Basis (Continued)

a. (Continued)

The RHR problem that occurred at Sequoyah Nuclear Plant was the result of their plant specific configuration. The minimum flow lines at SQN are two independent non-orificed miniflow lines with separate control valves that tie into the crosstied suction lines for the RHR pumps. This is contrasted to the design at BFN which consists of individual tightly orificed lines that discharge to a single line returning to the torus. Had the BWROG generic response been applied to the SQN configuration, the conclusion would not have precluded the need for specific calculations to evaluate the potential for deadheading an RHR pump. As noted in the ORR report, the site determined that, in light of the SQN problem that the issue should be reevaluated by Nuclear Engineering for BFN. The relook by Nuclear Engineering included a review of the SQN Incident Investigation 89-097, consideration of various low flow scenarios, review of BFN and SQN responses to IE Bulletin 88-04, and review of the BFN Operating Instructions for the RHR and Core Spray systems. Results of the relook did not indicate any reason to change the BFN position on NRC Bulletin 88-04. The review did recommend, however, that Systems Engineering evaluate the Operating and Surveillance Instructions for the Core Spray system to confirm that low flow operations restrictions account for individual pump characteristics. This review has been completed and it has been determined no adverse pump interactions are anticipated. This evaluation was based on the operating and surveillance instructions, the individual pump characteristics, and anticipated plant operating conditions. This response has been forwarded to the Nuclear Experience Review group and subsequently submitted to the corporate NER organization as an updated response on July 2, 1990. (reference RIMS E10 90C702 963).

NRC Bulletin 88-04 also raised an issue about the adequacy of the existing design miniflow path flow rates. The basis for this concern was that the miniflow discharges were designed at 5 percent to 15 percent of rated pump flow based on pump heating considerations, and that pump manufacturers were now recommending minimum flows of 25 percent to 35 percent based on flow separation or hydraulic instabilities. Flow separation or hydraulic instabilities due to inadequate minimum flow could cause unbalanced loading and vibration leading to excessive wear and resultant shortened pump life. The BWROG report stated operating and maintenance history for BWR plants indicated that, for the type of service experience for the RHR and Core Spray pumps, low flow or deadheaded operation has had no detectable effect on pump availability. The BWROG also searched the Nuclear Plant Reliability Data System history files and found no cases of pump failure or degradation below required capacity that could be attributed to low flow or deadheading of safety related pumps. Additionally, examination of pumps during maintenance inspections after normal

C. RESOLUTION OF INDUSTRY ISSUES (Continued)

2. Basis (Continued)

a. (Continued)

operating histories and for cases where pumps had been inadvertently run deadheaded for prolonged periods had similarly not uncovered any indication of excessive wear. This experience base includes at least one case at the Fermi Nuclear Plant where an RHR pump was inadvertently operated deadheaded for one and one half hours because of a spurious isolation. At BFN, RHR pumps had been disassembled for wear ring modifications and replacement during this outage and indications of the type of wear discussed in NRC Bulletin 88-04 were not observed. A representative of the pump vendor has also inspected RHR pump impellers and indicated that wear patterns are characteristic of normal expected usage.

Flow separation and hydraulic instabilities would result in the gradual degradation of pump performance. The basis for the vendor recommended increased miniflow rates is an assumed cumulative time spent in miniflow mode. For this reason they recommend a flow rate of at least 35 to 40 percent for continuous operation and 25 to 30 percent for intermittent operation in the minimum flow mode. Intermittent operation is defined as less than two hours of minimum flow operation in any 24 hours. The total time the safety related pumps will operate in minimum flow mode over the life of the BWR plant, as given in the response, is at the very most one percent of the time given by the pump manufacturers for intermittent operation. The ASME Section XI testing program would also detect degradation of pump performance due to any reason well before any affect on the pumps ability to meet its safety function.

Responsible Organization
System Engineering

Due Date
Complete

- b. Questions concerning the conservatism of the plant shutdown/cooldown procedure are discussed in another concern (Item # B) within this report. These questions arose from review of an industry event, reported by INPO, in which an BWR experienced an inadvertent criticality using a similar procedure. The TVA review of this nuclear experience item was limited to the minimum required to address the specific deficiencies initially reported by INPO at the other utility (i.e., training on the procedure, definition of control room responsibilities, simulator fidelity).

Initiative was not taken to question the prudence of using a shutdown/cooldown sequence which could place undue burden on the operators. The review of simulator fidelity also appeared limited to assessing the ability to simulate a positive reactivity addition, rather than verifying the ability to simulate actual plant response during such an event.

C. RESOLUTION OF INDUSTRY ISSUES, (Continued)

2. Basis (Continued)

b. (Continued)

RESPONSE/ACTION PLAN

BFW did not initially recognize the significance of this INPO item. Discussions between BFW Technical Support and the Nuclear Fuel organization have subsequently taken place to identify the best way to resolve the issue. Three alternative shutdown methods discussed were:

1. Prohibiting reactor cooldown until all control rods are inserted.
2. Specifying the cooldown rate as a function of control rod density so that subcriticality is assured.
3. Manually scramming the reactor at a specified power level or after subcriticality is achieved (prior to reactor cooldown).

Option 3 is the simplest and most expeditious way of shutting down. Its chief drawback is increasing the transient duty cycle on the vessel from the scram. Option 2 is the most complex and has the most pitfalls related to increased monitoring requirements and calculational dependencies. Option 1 was considered the best path considering complexity and minimizing reactor fatigue cycles and will be adopted for routine shutdowns as previously indicated in the response to item B of this report.

The existing simulator core model would need a considerable upgrade to adequately model a complex shutdown sequence. The basic principles of reactivity monitoring either for startup or shutdown are similar and, we believe the existing simulator and training program, particularly as augmented by the lesson plans related to the industry criticality events provided by INPO, does a good job of preparing operators for the vast majority of anticipated plant situations. The simulator upgrade project does include better core models and will improve fidelity of the simulation exercises in this regard.

D. AGGRESSIVE IN-DEPTH PURSUIT OF TECHNICAL ISSUES

1. Concern

Technical issues had not always been evaluated in sufficient depth or aggressively pursued to completion.

Response Summary

The review of technical issues affecting the plant was previously divided between technical support engineering and maintenance engineers. This tended to reduce the effectiveness of technical reviews since overall responsibility was not always clear and technical expertise was in different organizations. This maintenance engineering function has been transferred to technical services thus consolidating technical knowledge and review accountability within a single organization. The development and implementation of the system engineering organization is providing a centralized organizational basis with the skills and knowledge necessary to ensure a detailed technical assessment of past and new technical issues. Additionally, this provides a common point to coordinate and to followup on implementation of corrective actions.

2. Basis

- a. The June 1989 ORR Report previously identified a concern that vendor recommendations were not implemented in a timely manner. An example given was GE Service Information Letter (SIL) 419, a "Category 1" SIL issued in August 1985 (A Category 1 is defined by GE as an item "that could have an early impact on BWR plant availability, reliability, or safe operation"). This SIL recommends the inspection of certain 0.125-inch Hancock gate valves in the Hydraulic Control Units (HCU). BFN intends to perform the inspection prior to restart. The work was scheduled to be performed concurrently with the scram diaphragm replacement. Work on the west bank HCU's was started on August 28, 1989, but no inspections of the subject valves had been made to February 1990. The ORR Team was told the inspections were being postponed to be performed while working the east bank, because of lack of parts. Implementation of this SIL has been delayed for over four years. Continued failure to aggressively pursue this potential safety-related issue could impact restart schedules, especially if inspection results increase the scope beyond that currently anticipated.

D. AGGRESSIVE IN-DEPTH PURSUIT OF TECHNICAL ISSUES (Continued)

2. Basis (Continued)

a. (Continued)

RESPONSE/ACTION PLAN

Following issuance of SIL 419, BFN revised maintenance procedure NMII-28, "Control Rod Drive Hydraulic Control Unit Module - Repair and Replacement" to inspect the valves as modules were removed for scheduled maintenance. This was in compliance with the immediate recommendations of the SIL. A long term recommendation was made to consider replacing the gate valve wedges with a material less susceptible to IGSCC. In response to the subject ORR concern in 1989, BFN committed to perform inspection of the isolation valves on 20 percent of the unit 2 ECU prior to startup. Since then, all of the 85-617 valves have been inspected. Twenty-five percent had wedges which exhibited cracking. These wedges have been replaced.

This valve inspection required that an adequate supply of spare parts be available to compensate for the possibility of have a part break during the inspection that would require a long system outage. This would result in being unable to stroke rods for an extended period of time. Procurement Request 8906450 was issued by plant maintenance on July 25, 1989 for replacement parts for the valves. With expedition, the order was issued to GE on October 5, 1989. TVA tried to further expedite the order from GE without success. The last of the spare parts were shipped from GE in the middle of March 1990. Delays in issuing a purchase requisition and supply problems were due to difficulties in obtaining a supplier who could supply wedges that were not susceptible to IGSCC. Only one company, General Electric, would supply upgraded wedges of a new design and material that should preclude cracking.

The Nuclear Experience Review program ensures the review and tracking of SIL's. Escalation provisions and periodic reporting to management provides a means to monitor timely dispositioning of review items and to flag areas needing attention.

As discussed in the ORR Phase One report, GE was contracted to provide what is known as the GE System Review as part of the Regulatory Performance Improvement Plan. This review, in part, consisted of a review of SILs on 22 primary systems including reactivity control, ECCS/RCIC, and the PCIS systems.

D. AGGRESSIVE IN-DEPTH PURSUIT OF TECHNICAL ISSUES (Continued)

2. Basia (Continued)

a. (Continued)

A commitment to disposition GE System Review recommendations became a part of Volume III of the Nuclear Performance Plan. System engineers reviewed and dispositioned these recommendations which included SILs on their assigned systems. These dispositioned items were then subsequently presented, reviewed, and approved by a System Engineering Review Board and PORC.

Additionally, in early 1989, a separate review was conducted for all GE SILs issued after 1984. This review was conducted for the purpose of ensuring the response was adequate and that any identified action items are being tracked through implementation.

Responsible Organization
Maintenance

Due Date
Complete

- b. Incident investigation report 89-93, Low Scram Pilot Air Header Pressure Scram on 12/6/89 caused by a failed solder connection, described a failure (separation) of an one-half inch solder joint. The report noted that maintenance history revealed nine previous "broken" connections associated with the control air system at Browns Ferry. While the investigation report appeared thorough, a discussion with a cognizant metallurgist indicated that the joint solder wetted area appeared to have complete bond. Metallurgical and chemical analyses of the solder and piping were not done to determine if the flux, solder constituents or any impurities in the bonding may have contributed to the failure. A more thorough analysis may have indicated the cause of this recurring failure.

RESPONSE/ACTION PLAN

As part of the referenced incident investigation, analytic assistance was provided by the Nuclear Engineering Materials Group. The tests/examinations performed were based upon their own expertise and material observations, and were accepted by the plant as a reasonable approach. We agree that the solder/flux characteristics could have been formally analyzed to rule out certain potential failure mode contributors. The failed parts were discarded after the investigation so we cannot explore this avenue in arrears.

D. AGGRESSIVE IN-DEPTH PURSUIT OF TECHNICAL ISSUES (Continued)

2. Basis (Continued)

b. (Continued)

RESPONSE/ACTION PLAN (Continued)

The control air system at BFW was designed and built utilizing copper tubing with soldered joints. Flux and solder used at BFW are bought to the same specifications which allow for use on both safety and non-safety components. The quality of the fabrication materials was thus not considered a variable. The original quality assurance inspections and craftsmen qualifications were typically not as rigorous during initial construction as they are today. Improper work technique during original construction was concluded to be the root cause as identified in the event report. During a recent outage of the steam air header, it was leak checked and all identified leaks repaired. Should similar problems in this area reoccur, we will expand the cause determination. Maintenance techniques related to this system and problem will also be reviewed for adequacy.

Responsible Organization
Maintenance

Due Date
September 28, 1990

- c. Although the NRC IE Bulletin 88-04 concerns safety-related pumps (see item C. of this report), it is not apparent that a review of Balance of Plant systems where dual pump operation is possible has been made or an evaluation of miniflow adequacy has been made or planned.

RESPONSE/ACTION PLAN

The miniflow arrangement discussed in IE Bulletin 88-04 is not a standard arrangement used for industrial applications and typical pump configurations. Its use at Boiling Water Plants is limited to low pressure core injection type systems and there is an engineering basis for this particular application.

D. AGGRESSIVE IN-DEPTH PURSUIT OF TECHNICAL ISSUES (Continued)

2. Basin (Continued)

c. (Continued)

The Systems Engineering Section has reviewed the other pump configurations on the various piping systems not addressed by TVA's response to NRC Bulletin 88-04. In the few instances where minimum flow lines are installed, none are configured with common minimum flow piping shared by parallel pumps.

We agree that safety issues raised by NRC or internally by TVA should be evaluated for full impact on Browns Ferry. Non-safety systems are obviously important in maintaining high plant reliability and uncorrected problems can likewise involve significant capital risks.

- d. In a memorandum on May 25, 1989, the ORR Team provided detailed comments that resulted from performing a partial simulator validation of the startup procedure, 2-GOI-100. Among other comments, the ORR Team identified a conflict in the plant conditions at which the Immediate Range and Average Power Range Monitors overlap is verified per a Surveillance Instruction (SI). (The GOI and SI specified inconsistent power levels.) The ORR Team also noted that resolution of this conflict must consider the need to assure proper average power range monitor function prior to entering a mode in which intermediate range monitor scram functions are defeated. This comment has yet to be resolved. The conflict still exists and training is being conducted despite the disparity.

RESPONSE/ACTION PLAN

Although the May 25, 1989, memorandum was overlooked in error and no formal review assignment was made, the Operations Department was aware of the memorandum comments and was in the process of addressing them. A formal assignment was subsequently made for Operations to address each specific comment. The particular discrepancy cited in this concern as well as several other specific comments have been resolved by a revision to 2-GOI-100-1A. Other items are undergoing further evaluation. The Operations training group will be notified of the resolution results and will insure operator training has been updated as necessary prior to Unit 2 power ascension. Please refer to the response to Concern B for additional information on Operations management involvement in simulator exercises.

Responsible Organization
Operations

Due Date
September 15, 1990

B. LINE ORGANIZATION/TRAINING INTERFACE

1. Concern

Training effectiveness was being impacted by deficiencies in the communication among line organizations and training, and the lack of timely support for training activities.

Response Summary

Several steps as described below are being taken to improve Training's involvement in plant activities and to improve communications between organizations. Management expectations and participative roles are being formalized. For example, the Training Manager now functionally reports directly to the Plant Manager. This ensures that Training is routinely involved in plant affairs and provides an active interface with key plant organizations. INPO comments during the recent accreditation visit were positive concerning Training's interface with other line organizations.

2. Basis

- a. A decision to eliminate the use of Keff vs rod position curves from the startup procedure and to implement the use of criticality limit guidelines was not communicated to Training.

RESPONSE/ACTION PLAN

A meeting was held between BWR Fuel Engineering and Reactor Engineering on March 29, 1990. Training participated in this meeting which addressed the specific misunderstanding about the Keff vs rod position curves and the use of criticality limit guidelines. A representative from both BWR Fuel Engineering and Reactor Engineering will also participate in the startup training for Licensed Operator Requalification. Training will continue to participate in meetings between BWR Fuel Engineering and Reactor Engineering throughout startup preparation activities.

Responsible Organization

Training/Fuel Engineering/Reactor Engineering

Due Date

Ongoing (through startup)

- b. Training and Operations plans for the incorporation of the interim Safety Parameter Display System into the simulator were inconsistent.

E. LINE ORGANIZATION/TRAINING INTERFACE (Continued)

2. Basin (Continued)

b. (Continued)

RESPONSE/ACTION PLAN

A meeting was held between Operations and Operations Training on March 28, 1990 to ensure that plans for interim SPDS use and associated training needs were commonly understood. A stand-alone personal computer version SPDS work station was installed in the training center and was initially used to train operators. The SPDS will be fully integrated into the simulator prior to startup. Appropriate OI's, license training plans, and requalification training plans related to SPDS usage have been developed and will be implemented prior to startup.

Responsible Organization

Operator Training/Simulator Services

Due Date

December 10, 1990

- c. Revised reactor vessel water level curves needed to support training on the modified system had not been prepared by Nuclear Engineering (NE). The training is in progress. Senior NE management was not aware of the critical need for this information.

RESPONSE/ACTION PLAN

Operations Training and Simulator Services are aggressively pursuing these water level curves with NE task engineers for ECN-P7131. The problem has been escalated to senior NE management concerning the critical need for this information to support pending training exercises. A meeting was also held with NE management on February 13, 1990 to discuss overall Training needs for the Simulator Upgrade Project.

Responsible Organization

Nuclear Engineering

Due Date

October 1, 1990

- d. Resolution of some rod worth minimizer parameters was not completed in time to support initiation of startup training.

RESPONSE/ACTION PLAN

Reactor Engineering is currently performing software testing on the Rod Worth Minimizer (RWM) package to verify that the software will perform in accordance with vendor requirements. This testing will identify any discrepancies in the RWM. Following system debugging, details on the operation of this new package will be taught in Licensed Operator Requalification.

5. LINE ORGANIZATION/TRAINING INTERFACE (Continued)

3. Basin (Continued)

d. (Continued)

Responsible Organization
Operator Training

Due Date
October 1, 1990

- e. Late completion of numerous Technical Specification changes required prior to restart may impact the ability to adequately cover these in training. Training had not been informed of the planned changes which would permit advance preparation of training information.

RESPONSE/ACTION PLAN

Review of recent technical specification changes are a standard session of the requalification classes. Most technical specification changes have a 60 day implementation period so ample time exists for shift personnel review. If there are a large number of changes received near startup, special arrangements will be made with regard to operator training. Site Licensing is actively pursuing early submittal of all restart technical specification changes to minimize potential impact in this area.

Operations has been working with Licensing to prioritize the remaining Technical Specification changes to ensure the most important are processed as soon as possible. In addition, Licensing routes proposed Technical Specification changes to affected organizations (including Operations) for review. Operations then provides information on proposed changes to the Training Department to ensure adequate advance notice for operations related changes.

As noted above, special training sessions will be conducted prior to startup to address any technical specification changes made which were not previously addressed in the regular six-week training rotation.

Responsible Organization
Operator Training

Due Date
December 4, 1990

- f. Sequoyah has initiated training on proper Technical Specification usage. The need for this training had not been evaluated for Browns Ferry.

E. LINE ORGANIZATION/TRAINING INTERFACE (Continued)

2. Basis (Continued)

f. (Continued)

RESPONSE/ACTION PLAN

Browns Ferry Training has obtained and reviewed the materials used at Sequoyah to present training on proper Technical Specification usage. After evaluation of the Sequoyah material, the Operations Training Manager and the Acting Operations Superintendent determined that the approach used at SQN was not appropriate at BFN. We do, however, note that much of the SQN material had been previously integrated into the Licensed Requalification Program.

Responsible Organization
Training

Due Date
Complete

- g. The decision on completion of modifications which would impact operations and training (e.g., source range scrams) had not been reached or clearly communicated to Training.

RESPONSE/ACTION PLAN

A meeting was held between Operations and Operations Training on March 28, 1990 to ensure a common understanding on this item. The modifications to the SRMs (remote function for SRM scram coincidence shorting links) were discussed. The modification has subsequently been completed and placed on the simulator.

Responsible Organization
Operations and Operations Training

Due Date
Complete

- h. Instances were noted of inadequate communication of expectations to training by line management, and of reluctance by Training management to bring issues of inadequate support to appropriate line management attention.

RESPONSE/ACTION PLAN

A meeting was held between Operations and Operations Training on March 28, 1990 to ensure open lines of communications. A statement of expectations has been issued as an Operations Section Instruction Letter entitled "Conduct of Training". Attachment A of OTIL-28, "Student/Instructor Responsibilities" is used in initial and continuing training for simulator instructors and for operators. Management personnel routinely monitor training activities and will assure that these standards are being reinforced.

8. LINE ORGANIZATION/TRAINING INTERFACE (Continued)

2. AVIA (Continued)

h. (Continued)

The site organization has been realigned such that the Training Manager functionally reports directly to the Plant Manager. This will result in direct interface regularly between high levels of training and site management. This will allow any instances of inadequate support for training to be effectively communicated and resolved.

Responsible Organization

Plant Manager/Training

Due Date

Complete/Ongoing

F. SIMULATOR TRAINING

1. Concern

Full advantage was not being obtained from simulator training to ensure operator readiness for startup and to reinforce the requisite standards for conduct of operations.

Response Summary

An ongoing high level of management attention and involvement is a necessary ingredient in maximizing benefits derived from simulator training. A joint communique outlining management expectations regarding simulator training for both Operations and Training has been prepared. Additionally, as discussed in the below responses and in response to Concern E, steps have been undertaken which increase Operations management's direct involvement in simulator training and to improve communications between Training and the site organizations.

2. Basis

During observations of several requalification simulator training exercises using the plant startup procedure, the ORR Team noted the following:

- a. In some cases, requisite control room formality was not maintained. For example, instructors and operators were involved in conversations not related to the evolutions in progress.
- b. Instances of inadequate communications were observed including imprecise orders and alarms/conditions being announced in too low a voice to be clearly heard.
- c. Operating practices required in the control room were not consistently enforced (e.g., obtaining SOS and Reactor Engineer signatures authorizing use of rod pull sheets, logging unusual events).

RESPONSE/ACTION PLAN (Basis items a - c)

A meeting was held between Operations and Operations Training on March 28, 1990. A statement of expectations was issued as an Operations Section Instruction Letter entitled "Conduct of Training". Operations Training Instruction Letters are used in initial and continuing training for simulator instructors and for operators. Additionally, the Operations Management Observation Program includes a weekly observation of training activities.

Responsible Organization

Operations and Operations Training

Due Date

Complete

F. SIMULATOR TRAINING (Continued)

2. Basin (Continued)

- d. Opportunities to establish preferred operating practices were not used effectively. For example, the method and number of verifications of individual rod positions was left to the discretion of each unit operator.

RESPONSE/ACTION PLAN

The methodology for determining and verifying individual rod positions has been reevaluated and procedures have been revised to remove some of the administrative burden from the operations personnel. The applicable SIs will be revised to delete the requirement for recording the time when each rod move is completed. In addition, clarification has been added to reflect Technical Specification requirements for independent verification and who performs the verification. As a general rule, feedback from simulator sessions is routinely utilized by Operations to improve instructions.

Responsible Organization

Reactor Engineering

Due Date

Complete

- e. Thorough critiques were not always held at the end of each simulator session.

RESPONSE/ACTION PLAN

The Plant Manager will provide discrete instructions to the Training Manager regarding the expectations for thorough critiques by the simulator instructors. Additionally, a schedule was published by Operations on March 27, 1990 listing the Operations managers and the dates they are scheduled to observe simulator training. A schedule was published by Operations Training on March 26, 1990, listing the Training managers and the dates they are scheduled to observe simulator training. These schedules have been issued only to Operations and Operations Training management observers (not to the instructors or the crews). These observations are continuing and are reviewed regularly at the Curriculum Review Committee meetings. This review, along with clear expectations of the crew and instructor, will ensure proper conduct of simulator training.

Responsible Organization

Operations and Operations Training

Due Date

Ongoing

F. SIMULATOR TRAINING (Continued)

2. Basis (Continued)

- f. The training may not fully reflect intended procedures to be used for actual startup. For example, instructors noted that a modification to incorporate source range scrams might be performed before startup, and the procedure required use of Keff vs rod position curves which were not planned to be used during actual startup.

RESPONSE/ACTION PLAN

A meeting was held between BWR Fuel Engineering and Reactor Engineering on March 29, 1990. This meeting addressed the specific misunderstanding about the Keff vs rod position curves and the use of criticality limit guidelines. A representative from both BWR Fuel Engineering and Reactor Engineering will participate in Licensed Operator Requalification Week 6 (week 3 of startup related training) beginning on April 2, 1990. Training will continue to participate in meetings between BWR Fuel Engineering and Reactor Engineering throughout startup.

The decision to include source range monitor coincidence shorting links was conveyed to training on March 28, 1990 (see response to item E.2.g).

We do not expect major changes in the startup procedures prior to startup. Additionally, startup activities will be monitored carefully by Operations management and all evolutions will be rigorously planned. Prestartup reviews will also focus on use of the startup procedures and extra training requirements will be identified as needed.

Responsible Organization

Training/Fuel Engineering/Reactor Engineering

Due Date

Ongoing (through startup)

- g. Simulator hardware/software deficiencies detract from training effectiveness. For example:
- (1) The core map printout frequently printed incorrect rod positions requiring resolution.

F. SIMULATOR TRAINING (Continued)

2. Basin (Continued)

g. (Continued)

- (2) Frequent (several times per minute) source range period alarms were received which instructors and operators stated to be unlike the plant. In some cases, the alarm continued distracting personnel from the startup procedure; in others, it was silenced.
- (3) In one instance, a rod position anomaly was corrected without investigation, apparently because it was assumed to be a simulator malfunction.

RESPONSE/ACTION PLAN

In response to the specific items cited above, the core map printout problem and the source range period alarm problem have been corrected by Simulator Services. The rod position anomaly was known to be a simulator malfunction because the instructor had not input the malfunction at the instructor console. Also, the crew had just completed a malfunction on rod mispositioning as part of a scenario.

The overall method of handling simulator problems is addressed in a Nuclear Training position paper. This position paper assigns priority to problem reports (PRs) according to the following: (1) problems that would produce significant negative training are handled immediately, (2) problems that will require only a reasonable amount of work but do not produce negative training are handled next, and (3) problems that are significantly beyond the scope of the simulator model or will require significant man-hours to correct because of the model are not attempted, but will be corrected by the simulator upgrade project. This position paper has been used with INPO and NRC with favorable results.

Responsible Organization
Operator Training

Due Date
Complete

- b. In some cases, instructors did not adequately cover lessons learned or actively participate in the training evolution.

RESPONSE/ACTION PLAN

This item is addressed in the response to items a - c above.

P. SIMULATOR TRAINING (Continued)

2. Basin (Continued)

1. Both Operations and Training management expressed concern that simulator performance might regress following the recent successful completion of requalification examinations. However, neither group was proactive in preventing this from occurring. No management personnel were present during the first startup training conducted on February 19, 1990.

RESPONSE/ACTION PLAN

This item is addressed in the response to items a - c above.

G. ATTENTION TO OPERATIONAL DETAILS

1. Concern

Rigorous attention to operational details was sometimes lacking.

Response Summary

As discussed in the response to concern A and this concern, a number of management actions have been initiated in this topical area and will be followed up on. The SOSs will be required to document a discussion of these issues with each crew and the plant Operations Manager and Operations Superintendent will also discuss this as a generic issue in their weekly meetings with the Operations crews.

The continued monitoring of operator performance by Operations Management, coupled with emphasis at all levels on attention to detail, is being encouraged by Plant Management. The consistent implementation of the Operations Management Observation Check Program, scheduled periodic management-crew meetings, SOS/ASOS plant tours, use of the training AUO and the assignment of a Unit Operations Manager to the task of improving AUO performance are all intended to promote and improve rigorous attention to operational details. AUO performance has noticeably improved in recent months as indicated in recent reviews by ANI, NSRB, and NRC.

2. Basis

1. During a required de-energization of a 480-volt shutdown board:
 - a. No notification was given to the refueling crew although the action caused all area radiation monitors to alarm on the refuel floor.
 - b. Power was lost to two effluent monitors because the back-up supply was previously tagged out.
2. One breaker was noted removed from the 480-volt common board without the proper record in the Configuration Control Log. This condition had apparently existed for over two months.

G. ATTENTION TO OPERATIONAL DETAILS (Continued)

2. Basis (Continued)

RESPONSE/ACTION PLAN (Basis items 1 and 2)

The need for careful planning of plant evolutions and communications is emphasized to the crews during normal daily operations by the SOS and reinforced during simulator training. Each operator has attended a briefing conducted by the Operations Superintendent on attention to detail and the importance of fully assessing the operational impact of each planned evolution.

All systems under configuration control were reviewed and identified discrepancies were corrected. The Operations Superintendent issued a memorandum to all operations personnel regarding these discrepancies. A weekly audit is being performed by the status control group and QA has been requested to periodically audit the process and provide feedback to the Operations Superintendent.

Responsible Organization
Operations

Due Date
Complete

G. ATTENTION TO OPERATIONAL DETAILS (Continued)

2. Basia (Continued)

3. Assistant Unit Operators (AUOs) did not note several maintenance items for which MRs needed to be prepared.
4. Unit Operators (UOs) and AUOs did not always take action to correct inoperable indicating lights.
5. Communications were not always at the expected standard. This was particularly noted in phone calls from outside to the Control Room and during a radiological emergency drill.
6. Examples of improper logs, communications deficiencies and inattention to operation were noted during simulator training. These are discussed in more detail in another concern (Item # F) within this report.
7. On two occasions, AUOs used an uncontrolled, copied page of a procedure to perform an evolution.

RESPONSE/ACTION PLAN (Basia items 3 - 7)

See the response following item 11 of this section for a discussion of steps being taken to improve performance of Operations personnel.

8. The 480-volt boards 2A and 2B for turbine building ventilation are not on the rounds sheet, although an AUO observed did check them. These should be on the rounds sheet.

RESPONSE/ACTION PLAN (Basia item 8)

Rounds sheets for units 1 and 3 were revised to more accurately reflect the status of these units. A more detailed revision is underway for all round sheets to be completed prior to startup. This revision is being reviewed extensively by all operating crews and will be of a very high quality prior to beginning power operations. These items will be considered for that revision.

Responsible Organization
Operations

Due Date
Units 1 and 3 - Complete
Unit 2 - November 30, 1990

9. An AVO found two valves mispositioned when he started to perform a screen kvash procedure. He notified control room properly before repositioning the valves, but did not log the condition.
10. A Hold Order tag was noted still attached to a breaker which had been removed from the switchboard for repair.
11. A team member noticed a roll of tape resting on the top of a Core Spray Pump room sump pump so that it interfered with the float level detector. When the roll of tape was removed, the level indicator visibly moved. A similar observation was made during a tour with an AVO in the RHR/HPCI pump room where a grease gun was adrift with the potential for interfering with the sump level device.

RESPONSE/ACTION PLAN (Basis items 3 - 7, 9 - 11)

A Unit Operations Manager has been assigned to assist with AVO performance upgrade. He works directly with the AVOs on all issues surrounding job performance. He is tasked with monitoring AVO performance in the plant as well as during training periods. His duties also include routine sheet revision, AVO watchstanding upgrade, and direct management oversight and involvement on non-licensed operator issues. In addition to the Unit Operations Manager, the on-shift SOS and ASOS, along with staff management, will tour with the AVOs stressing proper watchstanding techniques, safety, and plant ownership.

AVO performance has noticeably improved in recent months. The best indicator are the reports of the same organizations which previously raised the issue of AVO performance. Recent reviews by ANI, NSRB, and NRC have consistently noted improvements in attitude and performance by the AVOs. Water spills in the plant have been dramatically reduced as one specific example.

In addition, all AVOs are scheduled to work at SQW for a week in a power operation environment. This program is already under way. Watchstation proficiency walk-through exams will be started again in August, which will help sustain the momentum. Hands on task training for the AVOs has been changed to allow all AVOs to provide training to each other to help expand their skills and confidence. The values and goals portion of the Franklin Time Management course has been scheduled in AVO requalification training to help instill the proper attitude in the AVOs. Additional SRO licensed personnel are being made available to the crews which will allow more direct supervisory involvement.

G. ATTENTION TO OPERATIONAL DETAILS (Continued)

2. Basis (Continued)

The improvements already noted, the additional programs already scheduled, plus the natural catalyst of the startup provide high confidence that AUCs will perform well for startup and power operations.

Responsible Organization
Operations

Due Date
Complete/Ongoing

12. Some floor drains were not routinely cleaned of debris or checked so they could perform their function. In some cases, these were adjacent to a sample station or in spaces was a radioactive spill would be worsened by a plugged drain.
- (1) There was no screen in a floor drain outside the east end of the control bay. This drain had been a factor in a reportable discharge sample to the State last November.
- (2) The drain by the issue station for personnel protection clothing on the 565-foot level of the Turbine Building did not drain properly when water from another drain system backed up in the area.

RESPONSE/ACTION PLAN (Basis item 12)

The Maintenance drain scupper cleaning crew was a temporary crew dedicated to the initial cleaning of the floor drains. Once the initial cleaning had been completed, the decision was made to complete subsequent cleaning under minor maintenance or work request depending on location and type of drain.

Responsible Organization
Operations

Due Date
Complete

H. PREVENTIVE MAINTENANCE

1. Concern

Some Preventive Maintenance (PM) activities have been deferred and removed from the overdue list without adequate technical justification.

Response Summary

We agree that timely performance of scheduled preventive maintenance enhances plant reliability. The three tier objectives and goals program has established a goal to maintain the percentage of late preventive maintenance to below the INPO industry average. Resource limitations have necessitated the prioritization of some preventive maintenance items. A program is in place to evaluate each preventive maintenance item prior to deferral and only those items which can be technically justified are deferred. As each system is returned to service, outstanding preventive maintenance items which have not been performed are reevaluated to ensure that adequate technical justification exists for not performing the preventive maintenance items. This self checking system is intended to ensure that all preventive maintenance required to support operability is performed.

2. Basis

- a. The June 1989 ORR report detailed a concern with the large number of backlogged PM items. Maintenance management stated that, in addition to increasing PM performance, one of the methods for reducing the backlog of outstanding PM activities (greater than 25 percent overdue) was deferral based on operational or technical assessments. The integrity of a deferral process is essential to ensure that the PM program remains credible.

A listing of 82 PM activities was provided to the ORR Team by the PM manager. This list was typical of PM items that had been categorized as "Not Performed" and that had been removed from the PM schedule and rescheduled to a later date. These items are no longer considered to be overdue and are not tracked as such.

A comment section was provided for each PM task on the list. A review of these comments revealed that approximately 20 percent of these "Not Performed" items had questionable justifications for deferral. The following are typical of the statements found under the comment sections: (Note that the ORR Team did not review any additional backup documentation that may have been contained in Plant Records.)

- "Not Tech Justified"
- "Deferral Not Approved"
- "Procedure Does Not Fit Work"
- "No Manpower"

H. PREVENTIVE MAINTENANCE (Continued)

2. Basis (Continued)

a. (Continued)

Further discussions with PM program personnel revealed that these items should not have been removed from the overdue list until they had received the appropriate technical justification for deferral in accordance with the requirements of the Site Director Standard Practice (SDSP) 6.3, "Preventive Maintenance Scheduling and Tracking." If the task does not meet those requirements, it should be tracked as overdue.

RESPONSE/ACTION PLAN

All PMs which were greater than 25 percent late had received a technical evaluation. In a number of cases the evaluation concluded the PM should be performed. Some of these PMs were later inadvertently removed from the late PM list. A thorough review of the PM database is in progress and PMs without adequate justification for non-performance will be considered late and reclassified appropriately.

Considerable emphasis has been placed on performing PMs on schedule and has resulted in a reduction in the number of late PMs by about 45 percent since December 1989.

The new Maintenance Planning and Control (MPAC) System is designed to automatically track PM items that are not performed by their due dates. Subsequent status changes such as deferrals or PM being performed can also be tracked by MPAC. MPAC was implemented in April 1990 and it was learned then, however, that the new system would not accept the existing PM status terminology, e.g., "Not Performed," "Not Technically Justified." Approximately 6000 items required data conversions to a terminology that MPAC would accept. Thirty-five hundred are complete and the remaining 2500 will be completed by September 30, 1990. Once the data conversions are complete, MPAC will track the status of all PMs and errors such as those cited will be eliminated.

Responsible Organization
Maintenance

Due Date
September 30, 1990

H. PREVENTIVE MAINTENANCE (Continued)

2. Basis (Continued)

- b. One specific PM that the ORR Team noted had not been performed since 1985 was a task for monitoring flow blockage in the unit two RHR Service Water System. This activity has a periodicity of one month. A Systems Engineer indicated that performance of this task was part of the responses to NRC Generic Letter 89-13 and INPO Significant Operational Event Report 84-01. This system was in service during 1989 when fuel was installed in the unit 2 reactor, and could have been performed during that period.

RESPONSE/ACTION PLAN

The subject PM, (E0235) has not been removed from the 25 percent Late List. The PM had been properly deferred and placed in the deferred status until November 29, 1989 when it was reactivated. It is now and has been on the 25 percent late list and is being carried as late.

The PM for monitoring flow blockage in the RHRSW heat exchangers for Unit 2 has not been performed since 1985 when Unit 2 was shutdown. This PM involves the performance of TI-63, RHRSW Flow Blockage Monitoring, which measures the pressure drop across the service water side of the heat exchangers and in the supply lines once every six months. This TI has no specific performance criteria, but rather records data and monitors it for significant changes and adverse trends needing investigation. Flow blockage in these heat exchangers (which have been cleaned during this outage) normally occurs only during prolonged use of the heat exchangers. With Unit 2 shutdown, these heat exchangers are only in service during the performance of the Surveillance Instruction (SI) that verifies the RHRSW pumps can meet their Technical Specification and ASME Section XI flow and head requirements. This SI is run once per quarter and each heat exchanger is in service for about 2 hours.

This PM is scheduled to be run prior to fuel load so that a baseline for future reference can be established.

Additionally, BFN has committed to several actions in our reply to NRC Generic Letter 89-13 "Service Water System Problems Affecting Safety Related Equipment" to further ensure reliability of the RHRSW system.

I. MAINTENANCE WORK PRACTICES

1. Concern

Observations in the area of maintenance work practices indicated that continued attention is required to achieve high standards of performance.

Response Summary

As noted by the ORR team, some work practices are still not at our level of expectations. These situations are being addressed by the current maintenance staff who are dedicated to achieving a high degree of excellence. These individuals are daily communicating a higher level of expectations and are raising acceptable work performance standards. Indicators such as reduced personnel errors, CAQs, safety, Licensee Event Reports, and increased productivity show that current approaches are being effective.

The new work order and maintenance planning system will further serve to improve the execution of the entire maintenance process by providing an integrated planning and scheduling methodology.

Additionally, a Peer Evaluation Program has been developed. This program is under the direction of the Maintenance Production Manager and will be used to obtain clear and concise evaluations of workmanship and performance quality while being used as a learning tool to further promote high standards of excellence. It was implemented for trial use on May 1, 1990 with full implementation on June 15, 1990. It is expected that through the continual evaluation of work practices, quality, safety, and professionalism by peers, higher standards will be achieved. Refer to the response to Concern A, item g, for further elaboration on the Peer Evaluation Program.

2. Basis

- a. Rigging for disassembly of a complex horizontally mounted 18-inch valve was performed using a direct lift from the hook of the Turbine Building crane. (This was a craft decision; no procedural guidance was provided.) The use of a chain fall and sling from the crane hook would have allowed for finer control and alignment and is a standard maintenance rigging practice.

RESPONSE/ACTION PLAN

We agree that the chainfall and sling method would have provided finer control and alignment. This information was provided to all riggers during the monthly information meeting with instructions to be alert for the best possible rigging techniques to use.

I. MAINTENANCE WORK PRACTICES (Continued)

2. Basis (Continued)

RESPONSE/ACTION PLAN (Continued)

Consideration was given to including rigging requirements and techniques in maintenance instructions and have planners provide rigging details in work instructions. It was decided, however, that because of the many variations of rigging required and even variations that could be used on any single lift, that rigging techniques and choice of equipment should be left as a skills-of-the-craft activity. Detail rigging instructions would unnecessarily hinder the craftsmen in the performance of their work and would probably require excessive procedure and work instruction changes once work had started. Maintenance craftsmen receive training in rigging techniques, requirements, safety, and inspection to supplement their work experience. Work planners specify which jobs require rigging, applicable site standards, and craft task qualifications.

Responsible Organization
Maintenance

Due Date
Complete

- b. Inspection of the removed body to bonnet gasket from the valve discussed above showed evidence of uneven compression of the gasket although there was no evidence of steam leakage. The procedure contained in the work package for reassembly provided no specifications for alignment or bolt torquing sequence. Further investigation pointed to the conclusion that the bonnet was most likely misaligned during a previous reassembly and that the misalignment took up the load on the gasket. Although a detailed print of the valve was provided as part of the work package, it was not present at the worksite.

Response/Action Plan

Maintenance history indicates that the misalignment of the bonnet occurred four years ago. Such poor work practices would no longer be performed or tolerated by our craftsmen due to the extensive training that they have had and the new standards being espoused. BFN now has a Maintenance Training Program that was implemented in July 1987. This program meets INPO guidelines and was accredited by the National Nuclear Accreditation Board on September 18, 1987. Specific valve training has been provided to the mechanical craftsmen as a certification qualification task. Certification is a prerequisite for working on valves. Instructions for the assembly and torquing of valve bonnets is included in the training course. Additionally, a work package is required to be at the work site, except in a contaminated area, and even then it should be available immediately outside the C-zone. This item was also discussed with the mechanical craftsmen during the monthly information meeting as an example of unacceptable work practices.

I. MAINTENANCE WORK PRACTICES (Continued)

2. Basis (Continued)

Response/Action Plan (Continued)

A recent maintenance related audit, BFA90019, by the BFN QA audit group showed work quality was acceptable.

Responsible Organization
Maintenance

Due Date
Complete

- c. During maintenance on a reactor feedwater turbine, internal parts were left uncovered and disassembled parts were scattered on the floor. On the other hand, the HPCI pump turbine, which was left in a disassembled state while awaiting parts delivery, had all exposed parts wrapped and protected.

RESPONSE/ACTION PLAN

This item is addressed in Concern A, item g of this report.

- d. A maintenance crew, marked as Not Applicable (N/A) a step in a procedure which called for vacuuming equipment because they could not obtain a vacuum cleaner.

RESPONSE/ACTION PLAN

The maintenance crew should not have N/A'ed this procedure step due to unavailability of cleaning equipment. Maintenance foremen and general foremen were not counselled in this case because it was initially believed that the use of N/A was acceptable in accordance with procedures. After further review, it was determined that the N/A was improper and this item was discussed with the electrical craftsmen during the monthly information meeting as an example of the need for adherence to procedural detail. A Maintenance Peer Evaluation Program has been developed and is expected to reduce the incidence of work discrepancies such as this item.

Responsible Organization
Maintenance

Due Date
Complete

I. MAINTENANCE WORK PRACTICES (Continued)

2. Basia (Continued)

- e. A work crew was observed torquing baseplate bolts. In this case, the bolts were overtorqued, then were backed off to obtain the correct torque. The foreman indicated that he saw no problem with overtorquing bolts as long as the final torque obtained was correct.

RESPONSE/ACTION PLAN

We agree with the observation that this torquing method is an unacceptable practice since excessive overtorquing could potentially cause bolt yielding not readily detectable by inspection. Proper torquing techniques and their importance have been discussed with craftsmen, foremen, and general foremen as a continuing training item. A formal lesson plan has also been prepared and is being used. Attendance at all maintenance continuing training classes is mandatory and attendance records are kept.

Responsible Organization
Maintenance

Due Date
Complete

- f. An electrician was observed wearing a metal watch while working in an energized panel.

RESPONSE/ACTION PLAN

All electricians were reminded during their weekly safety meeting of the safety hazards of wearing metal jewelry while working in an energized panel. They were further cautioned by the electrical supervisor during the monthly information meeting. Maintenance supervisors and foreman also monitor this type safety item during their field observations. Refer also to the response to concern 0 in this report for a discussion of activities to involve field personnel as line advocates of the industrial safety program.

Responsible Organization
Maintenance

Due Date
Complete/Ongoing

I. MAINTENANCE WORK PRACTICES (Continued)

2. Basis (Continued)

- g. Although the work package required performance of a procedure and the work package permitted no options for partial completion, a maintenance crew performed only certain sections of the procedure based on oral directions from an engineer.

RESPONSE/ACTION PLAN

Craftsmen have been made aware that work packages shall be worked as written unless returned to Planning and revised correctly. A maintenance engineer can provide clarification of the instruction but does not have the authority to change instructions without routing the package through the approval process. This item was also discussed in the monthly communication meeting.

Maintenance engineers were surveyed to determine if they understood that oral instructions could not be used to change a work instruction. Each engineer surveyed clearly understood that work is performed only to approved instructions and changes must be returned to the planner for incorporation into the work control document prior to working.

Additionally, the Plant Manager conducted meetings with all his employees including craftsmen and engineers and emphasized the importance of following procedures.

Responsible Organization
Maintenance

Due Date
Complete

- h. One maintenance work package called for the replacement of valve packing. The PMT called for a stroke test and leak test. During repacking it was determined that the valve stem was damaged and another MR was initiated to replace the stem. The stroking was performed for the first MR and the leak test requirement was deleted since it would be covered by the second MR for the valve stem. (It could not be determined who changed the requirements.) Unfortunately, the PMT for the second MR referenced the PMT covered under the first MR for the valve packing. This results in no PMT for valve leakage being performed even though the valve was completely disassembled.

I. MAINTENANCE WORK PRACTICES (Continued)

2. Basia (Continued)

h. (Continued)

RESPONSE/ACTION PLAN

Browns Ferry has taken several steps to improve the quality of pre-job work scoping and the planning of work packages. The basic work planning and control procedure, Site Director Standard Practice (SDSP) 7.6, has been replaced by a new maintenance management system. The new process, which is titled "Maintenance Management System", is comprehensive and designed to provide detailed guidance in each facet of the planning process. It was implemented on March 19, 1990, and was subjected to a period of debugging. The system has been debugged and is functioning well.

SDSP-7.6 procedurally controls the performance of post maintenance tests. Section 7.6.5 instructs the person performing the PMT to return the package to the originating planner for changes such as the one described in this concern. Planners then verify the legitimacy of the referenced work order.

Responsible Organization
Maintenance

Due Date
Complete

1. The work instruction for one MR required that the packing be adjusted on a valve. If that did not work, the work crew was instructed to replace the entire valve, since no parts were available. The completed work section stated that the valve bonnet had been replaced with no further explanation or change to the work instructions.

RESPONSE/ACTION PLAN

The mechanical craft have been instructed that if a work package cannot be worked as written, the package is to be returned to Planning for revision. This incident was placed on the monthly communication meeting agenda and discussed again by the mechanical supervisor.

Responsible Organization
Maintenance

Due Date
Complete

- j. During observation of a job to replace bearings in a pump, the foreman stated, when questioned by a team member, that he would have removed one of the shields from a double shielded bearing. The work instruction required that the double shielded bearing be replaced, but did not authorize the bearing modification.

I. MAINTENANCE WORK PRACTICES (Continued)

2. BARIS (Continued)

j. (Continued)

RESPONSE/ACTION PLAN

The craft have been informed that work instructions are to be followed and a revision to the work scope must be preceded by a work package revision. As stated in PMI 6.2, Conduct of Maintenance, maintenance personnel are responsible for: (1) following the instructions, (2) comparing the instructions with the work to ensure its adequacy and accuracy, and (3) stopping work and getting the instruction corrected if it is wrong. Any modification must be properly approved and documented before it can be worked with a work request.

Higher performance standards and a better understanding of the conduct of maintenance requirements are being reinforced daily through the routine interaction of craftsmen, foremen, general foremen and maintenance supervision.

Responsible Organization

Maintenance

Due Date

Complete

- k. Cleaning steps in a preventive maintenance procedure had been completed when a team member pointed out considerable dirt and grease in the bedplate (fire hazard). The crew at that point cleaned the bedplate.

RESPONSE/ACTION PLAN

BFN agrees housekeeping is an area of maintenance that needs continuous attention. A formal lesson plan was developed and craftsmen and foremen informed of their housekeeping responsibilities as detailed in SDSP 14.6, "Building and Facilities Housekeeping and Cleanliness". The lesson plan was given to the craftsmen as part of maintenance continuing training. Attendance at all maintenance continuing training classes is mandatory and attendance records are kept. This item was emphasized again to the craftsmen by identifying the level of cleanliness expected by the discipline supervisors during the monthly information meeting.

BFN is improving the housekeeping program by implementing the following changes:

1. Areas of responsibilities will be subdivided into smaller areas and the responsible individual's name will be posted conspicuously in the area.

I. MAINTENANCE WORK PRACTICES (Continued)

2. Basia (Continued)

RESPONSE/ACTION PLAN (Continued)

2. A plant housekeeping coordinator as recommended by INPO guidelines will be assigned to ensure that all deficiencies are addressed.

Responsible Organization
Maintenance

Due Date
October 15, 1990

1. Two instances were observed of maintenance work packages which had been worked up to three weeks beyond the expiration date of the controlled procedure copies in the package.

RESPONSE/ACTION PLAN

All maintenance craft (electrical, mechanical, and I&C) have been informed that the instructions in their work packages must be verified to be the latest approved instruction prior to performing the work. This information was reinforced by each discipline supervisor during the monthly information meeting.

Responsible Organization
Maintenance

Due Date
Complete

- m. The exhaust motor and fan for a shutdown board battery room were removed for repair. The exhaust duct was left open in a manner that greatly reduced the effectiveness of the battery room exhaust ventilation. The condition was corrected only after a second MR was processed to close the duct opening.

RESPONSE/ACTION PLAN

Electrical craftsmen have been informed of this poor work practice and instructed that when systems are opened for work and must be left unattended, the system shall be covered and put in the safest condition possible. This example of poor work practice was discussed during the craft monthly information meeting by the discipline supervisor.

Responsible Organization
Maintenance

Due Date
Complete

J. MAINTENANCE PLANNING

1. CONCEPT

Observations by ORR Team members indicated that continued attention in the area of planning skills is required to achieve high standards of performance.

Response Summary

Several steps have been taken to improve the quality of pre-job work scoping and the planning of work packages. The basic work planning and control procedure, SDSP 7.6, has been replaced by a new maintenance management system. The new system combined with new computer software (MPAC) is comprehensive and designed to provide detailed guidance in each facet of the planning process. It is subdivided into nine detail sections that provide complete guidance on the entire maintenance planning and work execution process. It was implemented on March 19, 1990, and was subjected to a period of debugging. The system is currently functioning well.

A two-phase planner training program has been developed to upgrade planner capabilities. A joint program curriculum was prepared by the planning and technical supervisors of Watts Bar, Sequoyah and Browns Ferry. Phase-one consists of the basics that all planners must complete. It includes such items as work plan preparation, bench mark standards for job duration estimation, and Post Maintenance Testing (PMT) planning. All planners have completed this phase. Phase two planner training covers a broad scope of core training courses designed to make planners more versatile. BFN training is coordinating the development of phase two course curriculum modules and a training schedule with TVA corporate Training and BFN Maintenance.

Browns Ferry's long term plans to upgrade the capabilities of individual work planners should significantly improve work package instructions. In the interim a lead engineer in each discipline is assisting in work planning. The lead engineers are providing expertise and will continue in this function until the planners are fully trained. Results to date show that the additional technical expertise is improving the quality of work packages.

Maintenance planning has historically not been as thorough for non-CSSC work as it has for safety related work. With the full implementation of the new maintenance management system, non-CSSC planning is in essence planned to an equivalent degree of thoroughness as for CSSC work. The work instructions do not contain superfluous information or leave maintenance activities to the discretion of the craftsmen.

J. MAINTENANCE PLANNING (Continued)

2. Basis

- a. One non-Critical System, Structures and Components (non-CSSC) work package for a valve packing adjustment described the method to adjust the packing in great detail. However, the planner also referenced section 8 of Mechanical Maintenance Instruction (PMI-51), "Maintenance of CSSC/Non-CSSC Valves and Flanges," as part of the work instruction. For the work activity described, PMI-51 is superfluous information. Further, while the PMI specified a leak test, there was no requirement for ensuring that the stem would move after the packing was adjusted.
- b. One package for a non-CSSC pump required the replacement of a mechanical seal. The package contained the following deficiencies:
 - (1) In the package, the planner referenced two different mechanical seals with a note that the craftsman determine which was correct.
 - (2) A Plant Manager's Instruction 6.2 "Skill of the Craft," authorization was used to allow the craftsmen to perform the repair with no formal instruction other than a generic vendor manual.
 - (3) In addition to replacing the mechanical seal, the work instruction told the craftsmen to check the pump shaft and bearings for damage and replace parts "as necessary."
 - (4) Parts information that was provided as part of the package contained data for every major pump part including shaft, wear rings, impeller, etc.
 - (5) There were no alignment measurements or acceptance criteria for coupling adjustment even though the coupling would be removed to replace the seal.
 - (6) Retest requirements specified only a leak test on the seal. In the event that pump internals were replaced, there was no requirement for additional PMI to ensure that the pump produced design flow.
- c. One Instrument MR involved the leak of glycerine from a gauge face. The work instructions said to troubleshoot, tighten the fitting, repair as necessary, and recalibrate, as required. The MR required a return of the package for replanning only if welding was necessary for repair. However, this gauge was installed in a thermal well and replacement is accomplished by unscrewing the gauge; no welding is required.
- d. Another Instrument MR gave the mechanic blanket authorization to trouble shoot, repair, and replace parts as necessary and to then determine the necessary PMI.

J. MAINTENANCE PLANNING (Continued)

2. Basis (Continued)

- e. One work package was for the repair of a cable which was pulled too far from a conduit. The work instruction referenced a procedure for the repair of flexible conduit. This procedure did not address how to repair the cable.
- f. For one work activity, unnecessary work was specified. The craftsmen were required to disassemble a small pump to determine if the proper bearings were installed. This bearing information could have been determined from the previous lubrication PM data sheet which listed the vendor part number for the bearings. This information was also listed on the label plate of the pump.
- g. Operations personnel indicated that electrical planners are inexperienced and do not apparently understand the scope of work since some requests for tagouts are incompatible with work to be performed.
- h. On one work activity, workers stopped the job because the component label plate differed from the MR. In addition, the component was wired differently than indicated in the work package.
- i. The team noted that although some of the October 1989 responses to the June 1989 ORR Report have been implemented, the following items are still outstanding:
 - (1) The revision to SDSP 7.6, "Maintenance Request and Tracking," has not been implemented.
 - (2) Engineers have not been assigned to senior planning positions.
 - (3) Planners still do not review completed work packages.
 - (4) Planners are not proactively involved in work packages that they have prepared, once the package is in progress.
 - (5) Planners are still not required to mark appropriate sections of the procedure as N/A when preparing work packages.

RESPONSE/ACTION PLAN (item 1)

- (1) SDSP-7.6 was implemented March 19, 1990.
- (2) BPN's long term plans to upgrade the capabilities of work planners should significantly improve work package instructions. In the interim, however, a lead engineer in each discipline is assisting in work planning. The lead engineers are providing essential expertise and will continue to do so until the planners are fully trained to assume responsibilities. Results to date show that the additional expertise is improving the quality of work packages.

J. MAINTENANCE PLANNING (Continued)

2. Basis (Continued)

1. (Continued)

- (3) SDSP-7.6, section 7.6.6 requires all completed work packages to be routed through Maintenance Planning prior to final closure and being sent to history.
 - (4) SDSP-7.6, section 7.6.5 requires all scope changes, addenda, and changes be returned to the Maintenance Planner for disposition.
 - (5) SDSP-7.6, section 7.6.2 requires planners to N/A any steps that are not applicable to the work package when planned.
- j. While work package feedback sheets are being routinely returned from the field, a random sampling of these feedbacks revealed no significant comments regarding work package content or quality.

K. PROCEDURE QUALITY

1. Concern

Deficiencies in procedures have detracted from the ability of plant personnel to conduct maintenance and operations efficiently. In some instances, procedure deficiencies have increased the potential for errors and have resulted in non-compliance.

Response Summary

Most of the procedures discussed in this section are older procedures and were written prior to issuance of BFN's procedure upgrade style and writers guides. These procedures are scheduled to be upgraded after restart as part of the long-term procedures effort. Presently, there are 362 working level procedures in the maintenance area that have not been upgraded. These do not include any surveillance instructions. 827 maintenance instructions and all maintenance surveillance instructions have been upgraded for restart. Those selected for upgrade prior to restart were based on the Probabilistic Risk Assessment (PRA) and those where procedures did not exist prior to shutdown of the plant.

The remaining 362 procedures will be prioritized as needed to perform work and will fall within the approved project schedule.

The provisions in our new work control program which allow the planners to write specific work instructions on out-of-service equipment address the need for having upgraded procedures for each minor anticipated work activity.

BFN writer and style guides were developed (using INPO, EPRI, and NRC guidelines) before the corporate writers guides were issued and were used for the near-term procedure upgrade effort. The Browns Ferry guides were reviewed by the site staff and the Nuclear Procedures Staff and compared against the corporate writers guides. This review indicated only minor differences between the guides. A decision was made to continue using the BFN guides to maintain procedural uniformity. As discussed in the response to item j of this concern, we expect to further improve the style guide for future use.

The specific items in the basis for this concern are addressed in the style guide, writers guides, and verification process and will be corrected during the procedure upgrade program. Human factors improvement will also be incorporated as part of the long-term procedure upgrade effort.

K. PROCEDURE QUALITY (Continued)

2. Basis

- a. Some maintenance procedures have a sequence of steps which require maintenance crews to have at least four separate discussions with operations personnel prior to starting the work. Two discussions are required with the Unit Operator, one with the Shift Support Supervisor (or the SOS) and one with the SOS. This is inefficient and unnecessary to safely control the work. In fact, the team observed the sequence of these steps being violated to expedite commencing work. This violation contributed, at least in part, to a maintenance crew starting a job without signing off the prerequisites as required.

RESPONSE/ACTION PLAN

Current maintenance procedures have not been revised to incorporate the advantages of the MPAC system. Many electrical procedures, for example, are written for specific tasks with each procedure written as a "stand alone" procedure. This results in duplication of prerequisites, precautions, and other administrative type signoffs including Unit Operator/SOS notifications.

Currently the MPAC system is being revised to include signoffs, notifications, and other actions that are common to all work activities. Procedures can then be revised to remove these type steps, leaving only the specific information required for the task being performed. The objective is to make maintenance instructions as concise as possible, including only the steps to perform the work. This will streamline the process, making the planning, performance and review of work packages more efficient.

Responsible Organization
Maintenance

Due Date

MPAC modification - October 1, 1992

Procedure implementation - two year review process with high usage procedures being revised earlier on an "as needed" basis.

- b. MMI-51 was deficient in numerous aspects and needs to be replaced with a series of procedures more specific to valve type and manufacturer. This is recognized by the Maintenance Procedures Manager.

RESPONSE/ACTION PLAN

The upgrade of MMI 51 is the top priority of the mechanical upgrade effort scheduled to begin October 1, 1990. This effort will initially issue individual procedures based on valve type. More specific procedures based on manufacturers will then be developed as the need arises. When these procedures are issued, MMI 51 will be cancelled.

K. PROCEDURE QUALITY (Continued)

2. Basia (Continued)

b. (Continued)

Responsible Organization
Maintenance

Due Date
June 1, 1991

- c. The June 1989 OMR Report stated that some signature steps in procedures were not clear as to what was meant to be accomplished by signing the step. The BFW response of October 1989 stated a checklist for verifying procedures in SDSP 7.4 "Procedure Review" requires that signature steps meet basic requirements. The team considers this checklist (item 56 in the checklist refers to signatures) is not satisfactory. It does not convey, adequately, the need to assess the meaning, clarity, preciseness and lack of ambiguity of signatures. Further, the BFW response did not discuss a separate procedure validation checklist in SDSP 7.4 which does not have any item that specifically addresses signature steps.

RESPONSE/ACTION PLAN

SDSP-7.4 was revised March 23, 1990, to provide a checklist item for the assessment of implementation of verification and placekeeping guidelines. This verification checklist is used by preparers and reviewers for all reviews for procedure changes and two-year reviews. The procedure style guide, PMI 2.3 was also revised to address site specific examples of verification and placekeeping. Procedures from other utilities were reviewed along with several NUREGs and INPO Good Practices to ensure appropriate guidance in this area. This will ensure that newly generated and existing procedures are assessed.

Responsible Organization
Site Procedures

Due Date
Complete

- d. Electrical Preventive Instruction, EPI-O-000-MOT 201, required certain motor double shielded bearings to be replaced but does not specify an allowed replacement. A work package which included this EPI for work on an air-wash pump motor did not provide this information either.

K. PROCEDURE QUALITY (Continued)

2. Basis (Continued)

d. (Continued)

RESPONSE/ACTION PLAN

EPI-0-000-MOT 001 (201 suffix in ORR basis for concern is a typographical error) is a general preventive maintenance procedure for lubrication of motor bearings. Since it is a generic procedure, specific part numbers are not listed for replacement motor bearings. Nevertheless, non-Intent Change No. 10 (NIC-10) to the procedure was issued to specify bearings that could be used in this specific motor. EPI-0-000-MOT001 has been changed to include types of bearings that are not to be used in these cases and directs the craftsmen to obtain additional planning information should these bearings be encountered.

It was decided at the start of the maintenance procedure upgrade program that a generic preventive maintenance procedure was more practical than individual procedures for each type of motor. Therefore, it was impractical, and not justified economically, to include piece part information for each motor type in a generic procedure.

Procedure deficiencies, in general, are being reduced due to more rigorous reviews instituted pursuant to SDSP-2.11, "Implementation and Changes of Site Procedures," and SDSP-7.4, "Procedure Reviews."

- e. A procedure to check radiological control air sampler flow referred to an appendix for the proper hose, but the appendix did not specify the size. The team observed a 1/4-inch hose being stretched over a 3/8-inch connector.

RESPONSE/ACTION PLAN

This hose is supplied by the manufacturer of the instrument and is stored in the kit with the manometer. This calibration instrument is the only one used by RADCON where a hose connection is not made with a mechanical fitting attached to the hose.

The subject procedure has been revised to specify the proper hose to be used.

Responsible Organization
RADCON

Due Date
Complete

K. PROCEDURE QUALITY (Continued)

2. Basin (Continued)

- f. A mechanical maintenance procedure for alignment of a diesel generator lube oil circulation pump to motor specified a minimum torque value for motor feet-to-foundation bolts. This is poor wording since "minimum" would allow any value over that, however great, to be acceptable.

RESPONSE/ACTION PLAN

The cited concern is not correct. WPI-6 is the plant instruction which addresses maintenance of the standby diesel generator engines. This instruction implements the vendor recommended maintenance program for these engines. Section C, step 9.16.8 specifies the required torque value for the feet-to-foundation bolts of the diesel generator lube oil circulation pump. This value is specified as 18 foot pounds and a minimum torque value is not specified. It is customary in industry and TVA to not specify a tolerance when specifying torque values. TVA relies on the skills of qualified craftsmen to achieve the specified torque subject to the calibration accuracy of the torquing device used. This particular step also has a quality control hold point for verification.

Additionally, craft personnel have been reinstructed as to the proper methods of torquing as stated in the response to concern I of this report.

- g. A procedure for calibration of a water level indicator for a condensate pot off a HPCI turbine supply line did not adequately specify the adapters and test fixtures needed to perform the calibration. For example, no sketches of the fixtures were included.

RESPONSE/ACTION PLAN

All level indication instrumentation for HPCI is now calibrated by upgraded calibration instructions. Special calibration configurations and test equipment are included as a part of these procedures.

Responsible Organization
Maintenance

Due Date
Complete

K. PROCEDURE QUALITY (Continued)

2. Basis (Continued)

- h. An SI.4.8.B.2 on effluent monitoring that covers refueling floor continuous air monitors listed locations for three of the continuous air monitors incorrectly.

RESPONSE/ACTION PLAN

SI.4.8.B.2 is being revised by the Chemistry group to correct these deficiencies.

Responsible Organization
Chemistry

Due Date
October 1, 1990

- i. Another concern (Item # L) within this report discusses problems with chemistry procedures. Concern for excessive signatures and initials in procedures is covered in item # M of this report.

RESPONSE/ACTION PLAN

As stated in the response to concern L, efforts are underway to streamline and simplify the CIs and the chemistry-related SIs. The concern regarding excessive signatures, is addressed in the response to concern M and has resulted in a reevaluation of the site philosophy and a revision to the style guide to optimize the use of signatures/initials in procedures. Please refer to concerns L and M for further details regarding these actions.

- j. Procedures in varying degree did not meet the specific procedure style and writers guides in Plant Managers instructions. Moreover, these style and writers guides generally did not reflect the most up-to-date guidelines on procedure preparation in TVA Nuclear Power Standards, e.g., human factor elements. Thus, these guidelines were not being reflected into BFN procedures as major revisions, rewrites, or new procedures are identified and prepared.

RESPONSE/ACTION PLAN

Most of the procedures discussed in this report are older procedures which were not written to the BFN procedure upgrade style guide and respective writers guides. As stated in the response summary above, these procedures will be upgraded as needed to perform work and in accordance with the approved project schedule.

K. PROCEDURE QUALITY (Continued)

2. Basis (Continued)

j. (Continued)

Writers guides and style guides establish format and content of BFN procedures for the near term upgrade effort and are utilized to provide specific directions to procedure and instruction writers. The criteria and directions are based upon guidance by such sources as INPO, the Electric Power Research Institute, and the NRC. We have improved the BFN style guide to provide more examples and ensure that human factors elements from various source documents are included to the extent practical. This revision has been reviewed by the Nuclear Procedures staff to ensure adequate implementation with respect to Nuclear Power Standards.

To date, BFN has approximately 3700 active site procedures of which approximately 2500 have been upgraded. The remaining procedures will be upgraded as part of the long term upgrade plan.

Responsible Organization
Site Procedures

Due Date
Ongoing

L. CHEMICAL SAMPLING AND ANALYSIS PROCEDURES

1. Concern

Chemistry procedures, especially Surveillance Instructions, are cumbersome, and do not consistently support the objective of gathering required information using proper control and documentation methods while practicing ALARA.

Response Summary

Chemistry procedures are designed to provide a standardized methodology for such activities as sample collection, analyses, and data logging/trending. The Chemistry procedures in the Chemistry Instruction (CI) format are much more streamlined and user friendly than Chemistry procedures in the Surveillance Instruction (SI) format. An effort has been ongoing over the last several years to incorporate analyst comments and to streamline/simplify the CI's. This same type effort is now being applied to Chemistry procedures in the SI format. The majority of the items listed in the basis of this concern were already being corrected. As specified in the individual action items below, this process is being accelerated and the scope broadened to meet the specific ORR concerns.

2. Basis

During phase one of the ORR, a concern was expressed that Chemistry Analysts did not consistently demonstrate high standards of performance in sampling and analysis. As observed during this phase of the ORR, the methodology and technique of sampling and analysis had improved, but the procedures in use were not fully supportive of this objective. In several cases observed, the procedures were detracting from the task of obtaining samples and data in a manner consistent with good practice and ALARA.

- a. To support the requirements of the Technical Specifications, many routine samples and analyses have been shifted into the Surveillance Program and are being conducted as SIs.
- b. SI documents are more complex and greatly increase the required analyst documentation of the details of the sample or analysis, compared to Chemistry Instructions (CI) used for the same activity when not requiring to meet the Technical Specifications. Instances existed where different procedures were used on different occasions for the same sample. An example was the requirement to sample reactor coolant every 96 hours by the SI, but it was done daily per the CI, using a less complex procedure.
- c. The CI program and its results fall under the quality program of the Chemistry Department and, therefore, have credibility. Thus, the extra administration of the SI contributes nothing to the overall quality of the final product.

L. CHEMICAL SAMPLING AND ANALYSIS PROCEDURES (Continued)

2. Basis (Continued)

c. (Continued)

RESPONSE/ACTION PLAN (Basis items a - c)

The specific procedures observed by the ORR team, (the reactor coolant and fuel pool SIs) have been revised to incorporate the use of CIs for sampling and analyses. The SIs for routine Technical Specification surveillance requirements (those performed more than once/week) have been revised to utilize CIs for sampling and analyses.

Responsible Organization
Chemistry Technical Support

Due Date
Complete

- d. The requirements imposed by some new SIs often detract from ALARA concepts because they require more time, mostly administrative, in radiological areas. To perform the task and properly make signoffs, the analyst is forced to spend more time in the radiation field and make more entries into contaminated areas, therefore contributing to radiological waste while increasing opportunity to spread contamination.

RESPONSE/ACTION PLAN

Where sample collection or analyses is conducted in a dose intensive area, the SI has either been revised to use the CI for sampling or streamlined to reduce the administrative burden.

Responsible Organization
Chemistry Technical Support

Due Date
Complete

- e. Analysts comments about streamlining the SIs and making them more "user friendly" during the validation process have been countered with "it doesn't meet the writers guides." It would appear that the writers guides should have the same objectives to obtain the sample or conduct the analysis properly. This item is discussed in more detail in another concern (Item # K), within this report.

L. CRITICAL SAMPLING AND ANALYSIS PROCEDURES (Continued)

2. Basis (Continued)

e. (Continued)

RESPONSE/ACTION PLAN

Chemistry reviewed this concern with Site Procedures staff. It was concluded that the SI's can be streamlined through removal of unnecessary signoffs and by referencing of CIs already in place while still meeting the applicable writers guides requirements. This streamlining and/or referencing CIs is complete for routine SIs and those involving ALARA concerns. The remaining Chemistry SIs will be streamlined as a part of the two-year review process. This understanding and goal has been communicated to all Section Qualified Reviewers by a memorandum from the Section Supervisor.

Responsible Organization

Chemistry Technical Support

Due Date

Complete

- f. Under observation of an ORR Team member, an SI for sampling Fuel Pool water took 75 minutes to perform. Records of previous performance of this sampling showed it had routinely been done in a much shorter period of time.

RESPONSE/ACTION PLAN

The fuel pool sampling SI has been revised to use the streamlined CI for the sampling process.

Responsible Organization

Chemistry Technical Support

Due Date

Complete

- g. SI steps were noted to be written without complete regard for the user. For example, temperature corrections on conductivity measurements were sequenced in the procedure while drawing the sample. However, those corrections were not made at the sample sink, but back at the laboratory.

L. CHEMICAL SAMPLING AND ANALYSIS PROCEDURES (Continued)

2. Basis (Continued)

- h. Some SI step sequencing and logic were not well thought out; for example, one procedure required a 100 ml sample flush of the same stream before each of three separate determinations were made. The extra flushes were not technically necessary.

RESPONSE/ACTION PLAN (Basis items g and h)

The subject SI's will be reviewed to ensure the step execution sequence is logical. Additionally, laboratory personnel have provided input via SI validations for improving the sequencing of steps. Frequently performed SIs and those involving ALARA concerns have been revised. The remaining Chemistry SIs (approximately 67) will be reviewed for logical step sequence as a part of their scheduled two-year review.

Responsible Organization
Chemistry Technical Support

Due Date
Ongoing

- i. Much discussion was occurring regarding the need for and value of obtaining Operations concurrence, permission, or signature for the SI performance. Here again, the writers guide appeared to be inflexible, without proper regard for what Operations really needed.

RESPONSE/ACTION PLAN

The need for Operations notification is being reviewed on a case-by-case basis per the guidance provided in the SI writers guide. These types of signoffs have already been removed from many Chemistry SIs. All frequently performed SIs and those involving ALARA concerns have been reviewed. The remaining Chemistry SIs will be reviewed as a part of their scheduled two-year review which includes review for logical step sequence and required notifications.

Tracking and performance of scheduled and conditional SIs is addressed in PMI-17.12 which was implemented on August 31, 1990.

Responsible Organization
Chemistry Technical Support

Due Date
Complete/Ongoing

M. SIGNATURES/INITIALS IN PROCEDURES

1. Concern

The excessive use of signatures and initials throughout procedures can detract from the importance of verifications required to ensure safety and quality. The efficiency of work can also be impacted.

Response Summary

There is a tendency to overprescribe signoffs and checklist requirements in procedures partly due to regulatory and quality assurance influences as well as self imposed restrictions. This practice can be to the net detriment of the procedure. We will reevaluate our philosophy and methodology in this area and revise our writers guides to optimize use of signature provisions in procedures.

2. Basis

- a. Excessive signatures and initials create an atmosphere in which they mean little. Reserving them for the more important steps enhances the attention that will be paid to assure the proper action is taken.

RESPONSE/ACTION PLAN

Site Procedures has reviewed all NUREGs and INPO Good Practices where guidance is given for placekeeping and verification activities to ensure that appropriate guidance is available to procedure writers and reviewers. This guidance has been made available through a revision to PMI-2.3, "Style Guide for Writing Instructions," which provides guidance for all plant working level procedures. Also, as discussed in the response to concern K, item c, the verification and two-year review checklist in SDSP-7.4, "Procedure Review," has been revised to include a step for assessing suitability of verification and placekeeping provisions.

The revision to the style guide was coordinated with the Nuclear Procedures Staff to implement guidance from the corporate guide. Positive feedback from several in-plant groups has been received on the guidance provided.

Responsible Organization
Site Procedures

Due Date
Complete

M. SIGNATURES/INITIALS IN PROCEDURES (Continued)

2. Basis (Continued)

- b. The reactor operator controlling rod withdrawal during startup in accordance with procedure 2-SI-4.3.B.1a-1, Control Rod Coupling Integrity Check-A1 Startup, is required to stop after each rod motion to initial and time the action. In some cases, this is for a single notch motion. While the team recognized that rod coupling and rod sequence actions must be positively ensured, the requirement for the operator to give his attention to initials and time entries in the procedures to this extent distract him from his instruments.

If the operator's signature and time are deemed necessary, Operations should consider rehearsing this procedure at the simulator and working out the optimum use of a second UO, perhaps to the extent of revising the procedure to provide for the second UO to verify and sign off for the steps.

RESPONSE/ACTION PLAN

The intent of initialing each control rod movement is to document conformance with technical specification surveillance requirement 4.3.B.1.a which reads as follows:

4.3.B. Control Rods

1. The coupling integrity shall be verified for each withdrawn control rod as follows:
 - a. Verify that the control rod is following the drive by observing a response in the nuclear instrumentation each time a rod is moved when the reactor is operating above the preset power level of the RSCS.

M. SIGNATURES/INITIALS IN PROCEDURES (Continued)

2. Basis (Continued)

b. (Continued)

We have reevaluated our methodology on this issue and have determined it is acceptable to remove some of the administrative burden imposed on Operations. The SIs listed below have been revised to delete the requirement for recording time when each rod move is completed. In addition, clarification has been added regarding independent verification of rod moves when the RWM is inoperable or bypassed. Specifically, instruction steps state that when required by Technical Specifications 3.3.B.3.b and 4.3.B.3.b.3 due to RWM being inoperable, a second licensed operator or other technically qualified member of the plant staff (i.e., Reactor Engineer or Shift Technical Advisor) shall verify that a operator performing rod movements is following the rod sequence and so document by placing initials in the "IV" blank for each movement completed while RWM is inoperable. A note was added to each Control Rod Movement Data Sheet which states that independent verification by a second UO or RE or STA is required ONLY when the RWM is inoperable or bypassed.

- * 2-SI-4.3.B.1.a, Control Rod Coupling Integrity Check
- * 2-SI-4.3.B.1.a-1, Control Rod Coupling Integrity Check - A1 Startup
- * 2-SI-4.3.B.1.a-2, Control Rod Coupling Integrity Check - A1 Shutdown
- * 2-SI-4.3.B.1.a-3, Control Rod Coupling Integrity Check - A2 Startup
- * 2-SI-4.3.B.1.a-4, Control Rod Coupling Integrity Check - A2 Shutdown
- * 2-SI-4.3.B.1.a-5, Control Rod Coupling Integrity Check - B1 Startup
- * 2-SI-4.3.B.1.a-6, Control Rod Coupling Integrity Check - B1 Shutdown
- * 2-SI-4.3.B.1.a-7, Control Rod Coupling Integrity Check - B2 Startup
- * 2-SI-4.3.B.1.a-8, Control Rod Coupling Integrity Check - B2 Shutdown

Responsible Organization

Reactor Engineering

Due Date

Complete

- c. Another concern (Item # L) within this report discusses excessive signatures in chemistry procedures that make the procedures inefficient and increase radiation exposure.

RESPONSE/ACTION PLAN

This item is addressed in the response to concern L of this report.

- d. Many initials appear to be used simply to track status of the work rather more than to certify that a key action has been completed properly. The need to constantly signoff work or operations steps may actually detract from proper performance particularly in radiological contamination areas.

M. SIGNATURES/INITIALS IN PROCEDURES (Continued)

2. Basis (Continued)

d. (Continued)

RESPONSE/ACTION PLAN

In some cases initials and checkoffs are used to simply track status of completion or placekeeping in a procedure. These are placekeeping methods recommended in INPO and NRC documents. Verification provisions can reduce errors; however, task efficiency may decrease and stay times in radiation areas increase when verification provisions are employed. The BFN Style Guide has been revised to allow checkoffs after groups of functional steps. This is very important for ALARA considerations and where checkoffs are not practical for each action in a sequence of related steps.

The following guidance is provided in SDSP-2.1 relative to work in radiological contamination areas:

Procedures shall be provided and followed step-by-step for all tasks where operations must be performed in a specified sequence and reliance on memory cannot be trusted. Procedures need not be present for frequently repeated routine procedural action. If documentation is required by a procedure, the necessary data shall be recorded as the task is performed. (STD-5.9.50, Paragraph 5.1.5.1). Data collected in a contaminated area (C-zone) should be verbally relayed to personnel outside the area, or transferred to a clean copy upon exiting the C-zone.

As noted, provisions are available within the procedures guidelines to minimize time spent in C-zones although some procedures may not be taking advantage of this relaxation. Also, as discussed in item a, we have reviewed our guidelines on signature requirements and made them more flexible and user friendly to meet the specific work activity needs.

Responsible Organization
Site Procedures

Due Date
Complete

H. GENERAL EMPLOYEE TRAINING

1. Concern

Some documentation issued for General Employee Training check-in information was out of date, inaccurate, and did not convey a sense of professionalism.

2. Basis

- a. The quality of the reproduced material in the handouts was often poor and presented an unprofessional image. In several cases, they were obviously copies of copies. Several were badly misaligned with logos, etc., running off the paper.
- b. Plant Notice 9, dated March 13, 1985, referred to Standard Practices BF-19-11 and BF-2-3. BF-19-11 was superseded by SDSF-32.2 on January 10, 1988, and BF-2-3 was superseded by SDSF 2.11 on February 20, 1986. Since these treated the issue of procedure adherence, the notice would be expected to demonstrate attention to detail. Further, the procedures adherence message conveyed by the notice was considered by the OHR Team to be incomplete.
- c. Plant Notice Number 4, dated February 27, 1984, implied an exception to the eating, smoking, and chewing in regulated areas. This subject was also included in an "All employees memorandum," dated December 17, 1987, which also included redundant and out-of-date information.
- d. The personnel contamination monitoring memorandum of July 7, 1983, was not representative of current practices.

RESPONSE/ACTION PLAN (Basis items a - d)

The concerns addressed in this section of the report are valid, however, they do not represent the material distributed in the General Employee Training. The material in question was being distributed by the Browns Ferry Human Resources organization when new employees check in. The check-in package has been reviewed. Poorly reproduced and/or superseded material has been removed from the packages.

Responsible Organization
Site Human Resource Services

Due Date
Complete

N. GENERAL EMPLOYEE TRAINING (Continued)

2. Basis (Continued)

- e. Discussions of these findings with various members of the Radiological Controls Department showed that they did not review the material, except as users when they renew their personal qualification.

RESPONSE/ACTION PLAN

The review of the material distributed by Human Resources is now a standing agenda item for the RADCON Curriculum Review Committee which meets quarterly at BFN to review the training programs. Most of this material will be eliminated since it is covered by other means (GET training).

Responsible Organization

Browns Ferry Training Department/RADCON

Due Date

Ongoing

0. OCCUPATIONAL SAFETY

1. Concern

Industrial safety practices and conditions need significant improvement to assure a consistently safe working environment.

Response Summary

BPN management is aware of the need for improved performance in the industrial safety area. This need was reidentified during the 1989 INPO evaluation of BPN. It is a management priority to aggressively seek and implement the actions necessary to effect the needed improvements in performance.

As addressed in the individual items below, the concerns of the ORR team are being addressed. In addition, a number of other initiatives are being taken to improve performance in the industrial safety areas. These initiatives include items such as:

- Use of the NUCLEAR NETWORK for obtaining information on specific safety topics.
- Procedure improvements regarding review and critique of accident investigation reports,
- Evaluation of high noise areas and increased audiometric testing of personnel,
- A plant-wide ladder and scaffold safety audit.
- A weekly Plant Managers housekeeping and safety tour with his direct reports, modifications managers, and the Industrial Safety supervisor has been established.
- An improvement in the number and quality of line management interlocking safety audits.
- Establishment of a plant wide safety team observation program.

A new Industrial Safety Manager was hired in April 1989. Since that time, Industrial Safety has received much greater attention by management at all levels and evidence is accruing that this attention has begun to be effective in reducing safety problems. Monthly averages for important safety indicators for the past 12 months (through June 1990) have improved as follows:

<u>Injuries</u>	<u>Per Month Averages</u>	
	<u>Finding Data</u>	<u>Past 12 Months Data</u>
Lost-Time	2.90	1.08
First aid required	65.20	52.67
Back (total)	12.13	6.58
Back (lost-time)	1.70	0.25

0. OCCUPATIONAL SAFETY (Continued)

RESPONSE SUMMARY (Continued)

In addition to these statistics, the cumulative data for lost-time injury and the recordable case injury rates have improved the first nine months of this fiscal year as compared to the first nine months of the last fiscal year; i.e., the current lost-time rate is 0.43 versus 0.66 and the current recordable case rate is 3.04 versus 3.40.

The Nuclear Power corporate objective has been to achieve the best industrial safety record in the utility industry. In order to reach this objective, achievable FY 1990 goals were established for lost-time injury rate, recordable case injury rate, and vehicle accident rate. These goals are monitored monthly by management at all levels. Corrective action is determined and taken when an organization exceeds its goal. While the BFN site as a whole has not met these established goals, the data does support the conclusion that the goals are achievable. The plant organization has, for example, met the goals each month (this fiscal year) for lost-time injury rate and vehicle accident rate and the recordable case injury rate is now well below the established goal.

The Modifications group has experienced a number of recordable injuries in recent weeks. The majority of these injuries were foreign bodies in the eye incurred by craftsmen working on drywell steel modifications. Discussions with Industrial Safety, Modifications management, and Ironworker representatives led to the purchase of "monogoggles" for use in the drywell. A letter addressing the hazards involved in the drywell work was issued to all Modifications employees.

Site management will continue to place a high priority on achieving the needed improvements in safety performance. Management at all levels will be held accountable for achieving safety performance in their respective areas which meets or exceeds the site goals. The achievement of these goals will be accomplished through increased management involvement in all aspects of job planning and implementation.

Additionally, a programmatic assessment of industrial safety activities will be conducted in preparation for the OSHA evaluation which is scheduled for early 1991. This assessment will include participants from independent organizations such as the corporate Occupational Health and Safety organization and the Nuclear Managers Review Group.

2. Basia

- a. When workmen struck a door frame in the reactor building with a load of metal scaffolding, an electrical arc was struck between the metal pipe and the door frame. Follow-up of the event was routine, instead of that expected for an electrical shock hazard.

0. OCCUPATIONAL SAFETY (Continued)

2. Basis (Continued)

a. (Continued)

RESPONSE/ACTION PLAN

A plant AUC was with the ORR Team Auditor when this concern was observed. The AUC took immediate action to have a deficiency tag placed on door 238. The AUC also initiated paper work which resulted in a maintenance request (MR 1025903) to evaluate the problem. No problems were found during the investigation of this MR.

Responsible Organization
Plant Maintenance

Due Date
Complete

- b. Means of egress were not consistently marked in BFN buildings as required by OSHA 1910.37(g). That regulation requires that access to exits shall be marked by readily visible signs with arrows indicating the direction of travel to reach the nearest exit.

RESPONSE/ACTION PLAN

The cited section of the OSHA standard, 1910.37(g) addresses exterior ways of exit access. The section of the OSHA standard to address the above issue is found in section 1910.37(q) Exit Marking item (5) which states: A sign reading "EXIT," or similar designation, with an arrow indicating the direction shall be placed in every location where the direction of travel to reach the nearest exit is not immediately apparent. The National Fire Protection Association, Life Safety Code 101, section 5, also addresses marking of exits.

The plant is not designed or constructed in a manner that facilitates full implementation of the OSHA guidelines. Restrictions related to security, radiological control, and containment features further complicate the situation. We will, however, survey the facility to ensure adequate markings are available for personnel evacuation.

Responsible Organization
Fire Protection/Industrial Safety

Due Date
October 15, 1990

- c. Tripping hazards were noted in walkways in the Turbine Buildings, Reactor Buildings, and Control Bay. These were typically obstructions reaching into the walkways caused by material, parts, and tools.
- d. Improperly secured welding leads, hoses, and cords were common on walkways and on stairs. These represented both tripping and slipping hazards.

0. OCCUPATIONAL SAFETY (Continued)

2. Basis (Continued)

d. (Continued)

RESPONSE/ACTION PLAN (Basis items c and d)

A joint walkdown of the above locations was conducted on March 24 and 25, 1990, by the Industrial Safety section and a line supervisor from Modifications. All tripping hazards were identified and corrected. The importance of identifying tripping hazards has been stressed to those individuals performing interlocking safety audits.

Responsible Organization
Modifications

Due Date
Complete

- e. Tripping hazards, holes, and uneven surfaces existed in areas outside the buildings and immediately alongside roads where no sidewalks are provided.

RESPONSE/ACTION PLAN

A complete walkdown of plant roadways, entry points to site buildings and established sidewalks was completed on March 25, 1990, by the Industrial Safety section. Three deficient hazards were noted and corrected. This will be emphasized during interlocking safety audits.

Responsible Organization
Industrial Safety

Due Date
Complete

- f. The barriers around a new section of sidewalk and fire system valve installation southeast of the West Portal were so placed as to present a tripping hazard for pedestrian traffic.

RESPONSE/ACTION PLAN

The Plant Maintenance group has removed this barrier and established a concrete curb around the subject area. Further, full and clear access has been established on the sidewalk. In the future, interlocking safety audits will emphasize these types of hazards.

Responsible Organization
Plant Maintenance

Due Date
Complete

- g. On two occasions observed, persons pushing large, heavy wheeled carts were not observant of the safety of persons in the path of the vehicle. On both occasions, "near misses" occurred.

0. OCCUPATIONAL SAFETY (Continued)

2. Rain (Continued)

g. (Continued)

RESPONSE/ACTION PLAN

The Industrial Safety section has generated a Safety Awareness Bulletin that addresses this unsafe act and the proper precautions to be utilized when performing this work task.

Responsible Organization
Industrial Safety

Due Date
Complete

- h. The reverse motion warning device was not operational on several vehicles, including a fork lift, a vendor's large garbage truck, and a large dump truck (Ø 23) used on site.

RESPONSE/ACTION PLAN

Reverse signal alarms on fork lift trucks are not required by our safety guidelines due to the unobstructed view to the rear.

For larger vehicles reverse signal alarms are required and, if inoperable, a designated flag person must be utilized to assist in safely conducting this type of movement. Dump truck No.25 was taken out of service on March 25, 1990 until the reverse signal alarm is repaired.

Responsible Organization
Industrial Safety

Due Date
Complete

- i. Many persons with no eye protection were observed entering and leaving the west doors of the machine shop which is clearly posted as an "eye protection required" area.

RESPONSE/ACTION PLAN

The Industrial Safety section conducted a site wide safety compliance audit on the proper use of personal protective equipment the week of March 26, 1990. Deficiencies noted were brought to the appropriate level of management attention for corrective action. Routine surveys will continue to focus on proper use of personal protective equipment.

Responsible Organization
Industrial Safety

Due Date
Ongoing

0. OCCUPATIONAL SAFETY (Continued)

2. Basis (Continued)

- j. Workmen were observed standing within touching distance of the buckets and arms of backhoes during digging. Machine operators were observed on numerous occasions to move filled buckets over other workmen.

RESPONSE/ACTION PLAN

A message on this item has been issued to the responsible Modifications craft supervisor from the Industrial Safety section. These concerns have been addressed at the crew safety meeting with the people performing this work. Specific safety instructions have been provided in order to prevent recurrence of these unsafe acts. Industrial Safety has observed several excavation operations and has not noted any recurrence of these unsafe acts.

Responsible Organization

Modifications and Plant Electrical Maintenance

Due Date

Complete

- k. Scaffolding toe boards were not always installed as required. After pointing one case out to the safety department (concerning work on a steam valve to a feedwater pump), the Safety Department shut down several jobs to correct the scaffolding.

RESPONSE/ACTION PLAN

The Industrial Safety section and a Modifications carpenter general foreman and foreman toured the unit 2 and 3 reactor buildings and turbine building March 25, 1990, seeking scaffold nonconformances in regard to the use of toe boards. Two deficiencies were noted and corrected. The proper use of toe boards on scaffolding will be emphasized to those individuals performing interlocking safety audits.

Responsible Organization

Modifications

Due Date

Complete

0. OCCUPATIONAL SAFETY (Continued)

2. Basis (Continued)

1. Two persons on a Plant Manager weekly tour stated that "we don't come under OSHA." The ORR Team noted that the TVA Safety Manual includes much of the OSHA regulations.

RESPONSE/ACTION PLAN

The Plant Manager has informed all participants in the weekly housekeeping and safety tour that TVA does in fact come under OSHA regulations.

Responsible Organization -
Plant Manager

Due Date
Complete

- m. Two persons were observed riding in the back of a moving van with open doors. One was seated on a box near the back of the van and the other was seated on the rear of the van floor with his legs out the back of the van--his feet were resting on the power tailgate.
- n. Motor vehicles appeared to occasionally exceed site speed limits, especially inside the protected area. This was especially hazardous where no sidewalks were provided for pedestrian traffic.
- o. A workman was observed stepping on a scaffolding handrail made of 2' x 4' lumber. The handrail broke under his weight.

RESPONSE/ACTION PLAN (Basis items m, n, and o)

The Industrial Safety section has addressed these concerns in the same Safety Awareness Bulletin for item g above.

Responsible Organization
Industrial Safety

Due Date
Complete

0. OCCUPATIONAL SAFETY (Continued)

2. Basis (Continued)

- p. An electrician was observed wearing a metal watch while working in an energized panel.

RESPONSE/ACTION PLAN

A message on this item was issued by the Industrial Safety section to the lead electrical supervisors for the plant and Modifications addressing this unsafe act. Further, the responsible supervisors have reviewed this observation along with the appropriate corrective actions during crew safety meetings.

Responsible Organization

Modifications and Plant Electrical Maintenance

Due Date

Complete

- q. Although part of the control building was posted as a "safety glasses required" area, this requirement was routinely ignored.

RESPONSE/ACTION PLAN

All appropriate areas of the control building have been posted as to requirements for personal protective equipment. As stated in the response to item i above, a comprehensive audit of personal protective equipment has also been performed.

Responsible Organization

Industrial Safety

Due Date

Complete

- r. Safety chains at the head of heavily used vertical fixed ladders were often left unhooked. Several were unhooked in low use areas. One was noted with a broken catch on the hook and another was held in place with a single strand of wire.

RESPONSE/ACTION PLAN

The Industrial Safety section addressed this concern in the same Safety Awareness Bulletin as item g above. This concern has also been emphasized to individuals performing interlocking safety audits.

Responsible Organization

Industrial Safety

Due Date

Complete

0. OCCUPATIONAL SAFETY (Continued)

2. Basin (Continued)

- a. The power lead to a portable welding machine was noted to be stretched tight by the position of the machine.

RESPONSE/ACTION PLAN

Presently the majority of welding machines at BFW are located around the unit 2 drywell. A safety inspection seeking out this concern was performed by Industrial Safety and a steamfitter general foreman. No deficiencies were observed. This type of deficiency will be emphasized to those individuals performing interlocking safety audits.

Responsible Organization

Modifications

Due Date

Complete

APPENDIX A

ORR TEAM COMMENTS ON BFN PLANT FINAL RESPONSE DATED OCTOBER 11, 1989 TO INTERIM REPORT OF THE OPERATIONAL READINESS REVIEW OF BROWNS FERRY UNIT 2

NOTE:

A status of actions from the October BFN response to the June 1989 ORR Report was provided in the form of a TROI computer printout (Action Status Report) to the ORR team the week of 29 January 1989.

Comments:

1. Section II.A. of the June ORR Report noted that Operator Aids in the Control Room were not in the simulator. The Action Status Report indicated this had been corrected. The team noted operator aids in the simulator that were not in the Control Room.

RESPONSE/ACTION PLAN

A single individual in Operations has been given responsibility for Operator Aids in the plant. This includes the responsibility to ensure the simulator matches the Unit 2 control room. Whenever new or revised control room aids are produced, he ensures that the simulator is updated, also.

2. The Action Status Report listed two items in the response to Section III.A. of the June ORR Report as complete which were not complete. One was issuance of a TVA Nuclear Power Standard on "Conduct of Operations." The other was an action to revise a drawing which was reported as complete when a drawing change request was sent to Nuclear Engineering.

RESPONSE/ACTION PLAN

The purpose of issuing a Nuclear Power Standard addressing conduct of operations as stated in the response to the Interim ORR Report was to clearly define control room team responsibilities and specify the expected conservative standard of operations. At the time of the original response, the schedule for issuing the standard supported BFN's need. When delays were encountered in issuing the NP Standard, Operations management made a decision to issue the plant equivalent procedure. This fulfilled the intent of the action stated in the response to the Interim ORR Report.

APPENDIX A
(Continued)

2. (Continued)

With the regard to the drawing comment and the response to the Interim ORR Report, the only action initially identified for ORR Concern III-A involving drawings is item (g) which concerns a review of flow diagram drawings and revision by Nuclear Engineering if needed. Nuclear Engineering has been given the responsibility for reviewing and revising drawings needed to support plant operation and maintenance. The review includes incorporation of associated Drawing Discrepancies and Design Change Notices. Primary and critical drawings for each system are issued in conjunction with the SPAR/SPOC process prior to declaring the system operable. Essential secondary drawings, as identified by the plant staff, will be revised and issued prior to the breaker closure milestone. This consolidated systematic review will improve the consistency and usability of the drawings. Primary and critical drawings are also reviewed for legibility by Operations personnel as part of the SPOC process. Corrective actions for all ORR concerns are reviewed by Site Programs prior to closure to ensure that the actions taken satisfy the intent of the original response.

Responsible Organization

Nuclear Engineering

Due Date

December 24, 1990

3. Section III.A. of the June ORR Report noted that an Operations Section Instruction Letter (OSIL) contained operational information that would more appropriately be placed in a higher tier document. The October Response indicated that the specific OSIL and others had been incorporated into higher tier documents. The team noted that another group of documents, Operations Memos, in some cases, contained operational information (e.g., electrical system lineup requirements) which should be reviewed for incorporation into higher tier documents.

RESPONSE/ACTION PLAN

Operations has performed a review of the operations memo book and categorized the memos into three types and will disposition them accordingly. Those memos containing short-term information which is no longer needed have been deleted. Those memos containing information which is still needed, but is not of a type which should be in site instructions, will be transferred to the Plant Operations Manager Instruction book. Memos containing information which should be in a site instruction will be incorporated into the appropriate instruction. These actions will be completed by June 1, 1991, and the operations memo book will be cancelled at that time. In the interim, the Operations Management Observation Checklist requires a periodic review of the Operations memo book. The intent of this review is to identify information which is outdated, superseded, or should be incorporated into procedures. This periodic check will ensure this information is correct and appropriate.

APPENDIX A
(Continued)

4. Section VI.C. of the June ORR Report discussed estimated critical position (ECP) calculations and recommends taking advantage of ECP predictions during approach to criticality. The October Response did not agree. However, the team found that the Reactor Engineering Group was planning to require minimum and maximum rod sequence pull steps below and above which the evolution would be stopped and an assessment made (i.e., if criticality is achieved before the lower limit or if it is not achieved by the upper limit).

RESPONSE/ACTION PLAN

Although we disagree with the original ORR recommendation, the plant staff continued to evaluate the basic issue for alternative approaches. This additional review resulted in formulation of a minimum/maximum rod position review method related to critical position. The Reactor Engineering Group has issued a Technical Instruction, TI-206, "Approach To Criticality" which provides for the ECP assessment referenced by the ORR team and a notification to the Shift Operations Supervisor to halt the approach to critical if the limits are reached.

Responsible Organization
Technical Support

Due Date
Complete

5. Section VI.D. of the June ORR Report discussed Reactor Vessel Water Level (RVWL) instrumentation. The October Response discussed some actions to be taken based on the then unit 2 reactor vessel fuel loaded condition. The team noted now that the fuel has been unloaded, Technical Support is planning to do some additional testing of the RVWL instruments while the fuel is out. Further, Technical Support obtained a recommendation from the General Electric Resident Engineer to check the newly installed reference leg piping for thermal expansion during the Power Ascension Program. These additional steps should help ensure the operability of the RVWL instrumentation.

RESPONSE/ACTION PLAN

As recommended, Systems Engineering conducted an industry review to determine the types of post modification tests that were performed by other BWRs that implemented similar modifications. This industry review consisted of nine BWRs, five of which performed similar modifications. The results of this review showed that the BFN post modification test was consistent with industry practice. The Plant Hatch test programs were unrelated to BFN, since they did not perform a similar modification.

APPENDIX A
(Continued)

The recommendation from the ORR was to vary reactor vessel level and verify that the instruments track. This additional testing will involve a significant man-hour expenditure and will involve some, or all, of the following:

- * Procedure preparation including in-depth technical reviews to prevent inadvertent Engineering Safety Feature (ESF) actuations
- * Setting of the Steam Separator in the Reactor Vessel
- * Moving a significant volume of water
- * Reactor Vessel Head placement
- * Continuous cavity wetdown to avoid airborne activity
- * Significant Man-rem Exposure

As part of the Power Ascension Program, thermal expansion inspections will be performed on specific systems. The scope of the program is as follows:

- * Observe piping systems to ensure freedom of movement without restriction by any modifications that have been made since the completion of OIE Bulletin 79-14 Inspection Program.
- * Demonstrate that the actual thermal response of critical piping is consistent with the movement data predicted by computer analysis.
- * Verify that the suspension components, pipe supports, and snubbers are functioning properly.

Systems Engineering has evaluated the testing that was performed for the subject ECN and has determined that it was technically adequate for proving the installation. After review of the tests that were performed by other utilities, the post modification test performed at BFN was consistent with industry standards.

After reviewing the degree of plant involvement necessary to vary reactor vessel level through its entire range and verify all the instruments affected respond correctly, no appreciable benefits are recognized. In addition to the possible impact on the restart schedule, this evolution might also subject the plant to potential unnecessary ESF actuations.

It is the plant's position that the integrity of the reactor vessel water level system be proven by the following programs.

APPENDIX A
(Continued)

- * Existing post modification tests as required by each respective modification.
- * Existing surveillance testing requirements as required for the involved vessel instrumentation.
- * Plant Corrective and Preventative Maintenance Programs.
- * Thermal expansion inspections as part of the Power Ascension Program.

Responsible Organization
Technical Support

Due Date
February 18, 1991

CONCURRENCE SHEET

DOCUMENT NAME: Response to Operational Readiness Review (ORR) - Phase Two Report

ORIGINATING ORG: Browns Ferry Nuclear Plant

DOCUMENT PREPARED BY: E. D. Charlton DATE: 8/24/90

ACCESSION NO.: 894 900824 924

CONCURRENCES		
NAME/ADDRESS	SIGNATURE - COMMENT	DATE
E. D. Charlton PAB K, BFN	<i>E.D. Charlton</i>	8/24/90
B. C. Morris PAB K, BFN	<i>BCM</i>	8-27-90
S. H. Rudge PAB K, BFN	<i>SHRudge</i>	8/29/90
L. W. Myers POB C, BFN	<i>Lew W Myers</i>	9/6/90
O. J. Zeringue PAB E, BFN	<i>OJZeringue</i>	9/14/90
9/11 #2 CK		

Instructions

- After each individual concurs, check a or b.
☒ a. forward to next individual
☐ b. contact this person _____ EXTENSION _____
- When concurrences are complete, forward to _____
 EXTENSION _____
- Other instructions.

8/20