UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-348/94-27 and 50-364/94-27

Licensee: Southern Nuclear Operating Company, Inc.
600 North 18th Street
Birmingham, AL 35291-0400

Docket Nos.: 50-348 and 50-364 License Nos.: NPF-2 and NPF-8

Facility Name: Joseph M. Farley Nuclear Plant Units 1 and 2

Inspection Conducted: October 17-21, 1994

Inspector: for M.Miller 11/6/94
Date Signed

Accompanying Personnel: M. Morgan, Resident Inspector

Approved by: 11/6/94
C. Casto, Chief
Test Program Section
Engineering Branch
Division of Reactor Safety
Date Signed

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of engineering and technical support activities, design changes, and plant modifications.

Results:

In the areas inspected, violations or deviations were not identified.

- The licensee's on-site engineering departments and groups recently have been re-organized (re-engineered, September 1994). (Section 2.a)

- The inspectors concluded that the onsite engineering organization performed their assigned responsibilities in a timely manner and maintained a manageable backlog. No safety concerns were identified in this area. (Section 2.b)

- One major modification, one system modification (addition), and seven temporary modifications were reviewed and assessed to determine the adequacy for controlling and tracking changes to plant configuration. The modifications were adequate and met regulatory requirements. (Section 3)

- Strength - Engineering Support has a Computer Services Group that provides both hardware and software support to the site. (Section 2.a.4)

- Weakness - The data base used for tracking the engineering backlogs was difficult to use in retrieving information. (Section 2.b)

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*S. Casey, Supervisor, Engineering Support
*M. Coleman, Manager, Maintenance Department
G. Dykes, Senior Engineer, Instrumentation and Control
*R. Hill, Nuclear Plant General Manager
*J. Kale, Supervisor, Maintenance Engineering Support Group
*R. Monk, Supervisor, Engineering Support
*R. Morris, Senior Engineer, Engineering Support
*R. Rogers, Supervisor, Engineering Support
*J. Thomas, Manager, Engineering Support Department
*C. Westberry, SAER Auditor
*R. Yance, Manager, Plant Modifications Department

Other licensee employees contacted during this inspection included engineers, technicians, craft, and administrative personnel.

NRC Personnel

*M. Morgan, Resident Inspector
*T. Ross, Senior Resident Inspector

*Attended exit meeting.

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Engineering and Technical Support Activities (37550)

a. Organization and Staffing

The inspectors reviewed the licensee's onsite engineering organization to determine whether the engineering organization was providing effective engineering support for the plant. Farley recently implemented a re-organization of onsite engineering in September 1994. The engineering organization structure was defined by requirements to support other plant groups and staffed according to functional needs. The onsite engineering organization was aligned to accomplish four primary functions: modifications, plant support, maintenance engineering support, and maintenance craft support. The new organization is described below.

1) Maintenance Craft Support Engineers

The Maintenance Department had three craft discipline groups: Electrical Group, Mechanical Group, and the Instrumentation and Control Group. Each of these groups had one maintenance support engineer that reports directly to

the craft supervisor. These three engineers provided direct day-to-day technical support as required by the group supervisor.

2) Maintenance Engineering Support Group (MESG)

The principle responsibility of the MESG was to provide engineering and technical support to the Maintenance Department. This group reported directly to the maintenance manager for direction. MESG was divided into the following sections: 1) electrical protective relaying, 2) predictive maintenance, 3) valve engineering (MOVs), 4) mechanical support, 5) electrical support, 6) I & C support, and 7) maintenance rule and procedures. Each section was involved in engineering evaluations and design.

3) Plant Modifications & Maintenance Support Department (PMD)

The principle responsibilities of PMD was to review design changes and implement plant modifications. Design changes were performed by other engineering sections both onsite and by corporate headquarters. PMD reviews and incorporates the design changes into modification packages for field installation. For modifications packages, PMD was required to review the design for installation; prepare engineering evaluations; initiate procurement of parts; develop work schedule; prepare work orders; prepare test procedures; and coordinate and follow field work. In addition, PMD was responsible for configuration control by maintaining the plant drawings.

4) Engineering Support Department

Engineering Support consisted of five separate engineering groups and was the largest engineering department onsite. The five groups and portions of their responsibilities were:

1) Steam Generator Services Group was responsible for all steam generator engineering and test activities.

2) Performance Review Group was responsible for operational support, event trending, LERs, notices, root cause evaluations, and licensing activities.

3) Equipment Evaluation Group was responsible for ISI/IST, PRA, lubrication, equipment failure trending, NDE exams, instrument air, and ILRT.

4) Engineering Support Group was responsible for reactor and balance of plant performance, heat exchangers, reactor engineering, service water, HVAC, and system support.

5) Computer Services Group was responsible for both the computer hardware and software (programs), process computer, preventive maintenance, corrective maintenance, and other electronic equipment in the plant. The inspectors considered this group to be a strength in engineering since it provides added support and expertise to electronics and computers.

b. Engineering Work Load and Backlog

The inspectors reviewed the status of selected engineering work and backlogs to determine if sufficient engineering resources and management attention were being focused to prevent the buildup of a large work load. The inspectors encountered difficulties in obtaining the work load and backlogs since onsite engineering was recently reorganized. In addition, the data base for tracking on going work and backlogs was not up to date. Engineering management agreed the data base for obtaining the work load and backlogs could be improved. The data base used for tracking backlogs was considered a weakness. However, the inspectors were able to determine the backlog through discussion with the individual engineers and supervisors. Portions of work load and backlogs reviewed included the following:

Completed Work or in Progress

1) PMD completed review of 34 of 35 design packages required for next Unit 2 refueling outage.

2) PMD completed 18 modification packages and sent these packages to planning for scheduling.

3) PMD was in the process of working on 13 on-going design change packages where the modifications were in progress during this inspection period.

4) MESG had 174 Problem Reports that were either recently completed, were in progress, or scheduled to be worked.

5) Support Engineering work loads were not examined in detail by the inspectors. However, in the areas examined the work loads were up to date and current.

Backlogs

1) There were 211 completed design packages that require engineering review to determine if these packages were still valid.

2) There were 578 site work items scheduled for the next four years; 261 were capital expenditures items, and 317 were operating/maintenance items. These work items require review by engineering to determine if they are still valid. Many of these 578 items were minor. During a review of these items, the inspectors did not identify any safety concerns.

The inspectors concluded that the onsite engineering organization performed their assigned responsibilities in a timely manner and maintained a manageable backlog. No safety concerns were identified in this area.

3. Modifications (37550)

The inspectors reviewed and assessed the licensee's modifications process to determine its adequacy for controlling and tracking changes to the plants configuration. Farley Nuclear Plant Administrative Procedure FNP-0-AP-8, Design Modification Control, provides controls for the preparation, review, and installation of plant modifications including temporary modifications identified as Minor Departures (MD). The inspectors reviewed several modifications including temporary modifications (TM) to determine if the requirements of FNP-0-AP-8 were met. The modifications were reviewed to ensure and verify that 1) applicable TS requirements and FSAR commitments were met, 2) adequate 50.59 and technical reviews were performed, 3) testing was specified and performed where applicable, and 4) control room drawings were updated. In addition, the inspectors conducted walkdowns to verify the modifications were installed as specified. The following modifications were examined:

Temporary Modifications

MD-94-2414, Unit 2	The cable wire for accumulator tank 2A level transmitter was disconnected and moved to spare terminals in the same penetration module. These changes were made to determine if there was a ground in the penetration.
MD-94-2415, Unit 2	Remove and isolate incore thimble D3 from service per Westinghouse letter LTR ALA-94-588 until next refueling outage. Inspect for cracks and test, if satisfactory return to service.
MD-94-2417, Unit 2	Remove flexible hoses from the upper coil (1 of 12) of the W Section of the 1D CTMT cooler, hoses Q1P16HCCWA and Q1P16HCCDWD and install blank flanges. This was required to prevent service water leakage in containment.

MD-94-2421, Unit 2	The CCW heat exchanger service water isolation valve Q2P16V007A operator supports required stiffening by having steel plates welded across the existing support angles. The operator supports for similar valves failed in the past.
MD-94-2423, Unit 2	The CCW heat exchanger service water isolation valves Q2P16V007B and Q2P16V007C operator supports required stiffening by having steel plates welded across the existing support angles. The operator supports failed in the past due to high cycle fatigue.
MD-94-2424, Unit 2	The heater coil for sensor (thermocouple) No. 3, Channel B (reactor level) in the ICCM system needed to be jumpered because it was open. The heater coil was in series with heater coils for Nos. 1, 5, and 7 points and needed to be jumpered to restore these other points to operability.
MD-94-2427, Unit 1	Install a 1/2 inch thick spacer ring in 1-2A diesel generator service water expansion joint Q1P16F517 to bring the flange dimensions within analyzed tolerances.

Major Modification

PCN S87-1-4052, Unit 1	(Partial modification) Replace service water piping with stainless steel type for piping that supplies the control room air conditioning units. Revision 2 expanded the scope of this modification where four removable, flanged, stainless steel spool pieces were installed in the carbon steel service water piping to facilitate mechanical cleaning of the existing piping.

System Modification

Background - Lab testing and experiences with the use of zinc compounds in BWRs - for control of initiation/progression of primary water stress corrosion cracking in Alloy 600 materials and an associated potential for reduction of radiation fields from primary coolant have been the primary contributors for use of a similar zinc addition application in PWRs. A program to further evaluate and demonstrate the benefits of zinc addition was initiated by members of the Electric Power Research Institute, the NSSS vendor and the vendor's owners group. With the cooperation of the Southern Nuclear Operating Company (SNC), Farley Unit 2 was selected to be the demonstration plant. A zinc injection and sampling system was installed (under plant PCN #S93-2-8549) and initial zinc injection was instituted in June 1994.

This system modification included design, fabrication and testing of a Zinc Addition and Monitoring System (ZAMS). The Farley Unit 2 prototype consisted of the following:

The RCS Sample Skid

This skid included an analyzer and related controls. Actual analysis was performed with the use of an Ionics Model #4800 analyzer. The use of this analyzer was chosen in order to minimize the overall chemical waste and the need for a fast response/highly accurate form of measurement.

The Zinc Addition Skid

This skid consisted of an on-line pump, installed spare and two batching tanks. Each tank contained a mix of demineralized water and zinc acetate. The powdered zinc acetate was fed from a dry material feeder. The mix was dissolved/thoroughly mixed with the use of a mechanical mixer/batch tank recirculation pump. Actual acetate addition was performed with the use of a low volume chemical injection pump which took a suction from the on-line batch tank and then discharged the acetate mix into the existing downstream discharge return associated with the plant's Boron Concentration Measurement System (BCMS). This point was selected in order to allow for the use of a lower pressure injection pump and existing piping/penetrations. The location also minimized a need for safety class boundary isolation valves, reduced the impact on overall plant system design and it greatly reduced the extent/magnitude of the modification. During the injection process, the off-line tank was batched and recirculation continued until the first tank was empty. With the use of an automatic, computer-controlled processing system, an automatic sequence of switch-over, off-line tank batching and on-line tank injection was performed.

The Control Skid

This skid included all power supplies, breakers, fuse blocks, motor starters and transformers and the ZAMS system computer console. This skid was attached to the zinc addition skid.

The zinc addition and control skids were located on the Unit 2, 121 ft. elevation, [in the Boron Thermal Regeneration System chiller room], while the sampling skid was located on the 139 ft. elevation, (inside the auxiliary building sample room). All skids were bolted to the floor and the bolting pattern had been analyzed to meet Safe Shutdown Earthquake seismic criteria.

The PCN Design Change Engineering Evaluation was noted to be thorough and contained the required "specifics" for skid placement and injection piping/electrical connections; however, as observed in July 1994, (See NRC Inspection Report 50-348,364/94-19,

Paragraph 3.b.1), the chosen ZAMS power supply source posed a problem due to unforeseen impacts with operation of the Unit 2 containment penetration circuitry.

The issue called into question the adequacy of SNC's compliance with technical specification (TS) requirements and the use of administrative controls to allow for the "energizing of normally de-energized circuits through containment penetrations" as pursuant to TS 3.8.3, "Electrical Equipment Protective Devices." The staff resident inspectors were concerned that SNC's administrative controls for the closing of the ZAMS power supply breaker, Breaker FE-RC3 failed to adequately address the potential safety consequences of energizing containment penetration circuitry for extended periods of time with insufficient overload protection.

Although the existing administrative controls were determined to be in literal compliance with the TS, SNC agreed that additional measures were warranted. A PCN was initiated in order to provide the capability of de-energizing the containment portion of the circuit whenever ZAMS was required for plant operation. Also, until such time as the above modification was complete, electrical penetration circuitry had been de-terminated and operations personnel had been instructed to ensure that this circuitry remains de-energized during accident conditions.

The following Design Verification Record revisions to the modification and their associated impact on plant safety were reviewed. The following revisions were adequate and met regulatory requirements:

- Installation of a new circuit breaker in receptacle panel 2B and related installation of conduit/cabling to the ZAMS skids.

- System connections to the, 1) RCS sampling system, 2) demineralized water supply, and 3) BCMS injection/return line.

- Installation of power, control, and instrumentation circuitry between the BTRS Chiller room and the RCS Sampling room.

- Approval for use of existing cable trays, installation of supports for new field-routed conduits.

- Corrections were made for previously requested cable routing and minor changes were made in the routing of the original cabling. Placement of terminations were corrected and field installation instructions were further clarified.

The following Design Verification Summaries to the modification and their associated impact on safety were adequate:

- Final installation/"hook-up" instructions for ZAMS cabling and piping and final skid placement/mounting.

- Use of teflon materials in the Analyzer skid as discussed in the vendor's chemistry criteria, FSAR Section 5.2.3.4. and vendor letter ALA-94-622. Use of the teflon materials was determined to be acceptable.

The following 10 CFR 50.59 evaluations for the modification and their associated impact on plant safety were acceptable:

- Review of load studies and the additional load required by ZAMS were determined not to exceed assumed loading requirement of receptacle transformer 2A.

- Review of impact on the existing plant electrical distribution system and changes in operations of existing systems; i.e. For systems which were affected by the ZAMS installation it was determined that these modifications "in no way" will change system operation nor will they affect plant safety.

- Review of installation of power, control, and instrumentation circuitry determined that changes described in the PCN would not adversely affect the intended operation of the existing electrical distribution system nor would the changes impact plant safety.

- Review of impacts on 1) seismic considerations, 2) fire protection/loading, 3) HVAC/heat loading, 4) skid drainage, and 5) final electrical loading considerations were determined to be acceptable in all cases.

- Review of the use of teflon, fluorinated and chlorinated materials in the ZAMS was determined to be acceptable after review of SCS/SNC and vendor analysis and after taking into consideration the relatively low likelihood of initiating events required for fluoride/chloride releases.

With the exception of the ZAMS power supply selection and the associated failure of the engineering staff to recognize the potential safety consequences of continually energizing the containment electrical penetration circuitry, the overall engineering evaluation for this modification was adequate. This system has functioned as designed since installation and initial operation.

4. Exit Interview

The inspection scope and results were summarized on October 21, 1994, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings. Proprietary information is not contained in this report. No dissenting comments were received from the licensee.

5. Acronyms and Initialisms

BCMS	Boron Concentration Measurement System
BTRS	Boron Thermal Regeneration System
BWR	Boiling Water Reactor
CFR	Code of Federal Regulations
CCW	Component Cooling Water
CTMT	Containment
FSAR	Final Safety Analysis Report
HVAC	Heating, Ventilation and Air Conditioning
ICCM	Inadequate Core Cooling Monitor
ILRT	Integrated Leak Rate Test
ISI	In Service Inspection
IST	In Service Testing
LER	Licensee Event Report
MD	Minor Departure
MESG	Maintenance Engineering Support Group
MOV	Motor Operated Valve
NDE	Non Destructive Examination
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
PCN	Plant Change Notice
PMD	Plant Modification and Maintenance Department
PRA	Probability Risk Assessment
PWR	Pressurized Water Reactor
RCS	Reactor Coolant System
TM	Temporary Modification
TS	Technical Specifications
SCS	Southern Company Services
SNC	Southern Nuclear Operating Company
ZAMS	Zinc Addition and Monitoring System