



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

Report Nos.: 50-400/92-21

Licensee: Carolina Power and Light Company
 P. O. Box 1551
 Raleigh, NC 27602

Docket Nos.: 50-400

License Nos.: NPF-63

Facility Name: Harris 1

Inspection Conducted: September 14-18, 1992

Inspector: Frank Jape 10/8/92
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 F. Jape, Chief Date Signed

Test Programs Section
 Engineering Branch
 Division of Reactor Safety

SUMMARY

Scope:

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

Results:

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

The modifications reviewed were adequately implemented. The licensee has a prioritization process in place for scheduling and implementing modifications important to safety. The licensee is developing a corporate standard and an action plan to improve the configuration control program. The addition of managers and engineers with operations experience in the design engineering department was a positive example of staffing changes. Guidelines are being developed to enhance the current training program for engineering.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *R. Black, Manager, Management/Organization, Harris Project Assessment Section (HPAS)
- A. Cockerill, Principal Engineer, Electrical/I&C Unit, Harris Engineering Support Section (HESS)
- *J. Cribb, Manager, Quality Control
- *M. Hamby, Project Specialist, Regulatory Compliance
- *C. Hinnant, General Manager, Harris Plant
- *D. Knepper, Manager, Site Unit, HESS
- *S. Mabe, Project Engineer, HPAS
- *V. McKay, Manager, Engineering/Technical Support Assessment, HPAS
- C. McKenzie, Manager, Nuclear Engineering Department Assessment Unit
- *J. Moyer, Manager, Harris Project Assessment Section
- C. Olexik, Manager, Regulatory Compliance
- *D. Rowan, Engineer, Modification Management
- D. Shockley, Manager, Modification Support Services
- V. Stephenson, Principal Engineer, Civil Unit, HESS
- W. Szuba, Manager, Modification Management
- J. Titlington, Principal Engineer, Mechanical Unit, HESS
- *R. Van Metre, Manager, HESS, Nuclear Engineering Department
- *M. Wallace, Senior Specialist, Regulatory Compliance
- A. Worth, Manager, Site Unit, HESS

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

NRC Resident Inspector

- *M. Shannon, Resident Inspector

*Attended exit interview

2. Design Changes and Plant Modifications (37700)

a. Plant Modifications to Improve Reactor Safety

The inspectors reviewed the licensee's initiative to identify and implement plant modifications to improve reactor safety. Documentation reviewed included the list of PCRs for the 1991 refueling outage; the PCR list for the 1992 refueling outage; list of PCRs implemented and turned over between the 1991 and 1992 refueling outages; Procedure PLP-627, Nuclear Plant Prioritization Program; Procedure HNP-7.4-1, Integrated Planning, Budgeting, and Scheduling System; and the Plant Review Group Guideline.

The PCR is used to initiate all proposed changes to plant systems and facilities. Items identified on a PCR are initially



categorized and prioritized by the appropriate systems engineer using the Nuclear Project prioritization process. If an item meets certain criteria a schedule index is developed to facilitate the scheduling of the project. The scheduling index process is aimed primarily at Preliminary Engineering and O&M and Capital modifications and projects. During the prioritizing and scheduling of PCRs, weighing factors are used based on the safety importance of the PCRs.

The PRG has increased its role in the review of minor modifications. The PRG also reviews the Master Project Schedule. The Master Project Schedule includes only major projects. Senior plant management and HESS management concur on the Master Project Schedule after the PRG review.

The inspectors reviewed the listed documentation and concluded that licensee management had demonstrated the use of a prioritization process for identifying and implementing plant modifications.

b. Planning, Development, and Implementation of Plant Modifications

The inspectors reviewed the PCRs listed below to determine the adequacy of the evaluations performed to meet 10 CFR 50.59 requirements; to verify that the PCRs were reviewed and approved in accordance with Technical Specifications and applicable administrative controls; applicable plant documents (drawings, plant procedures, FSAR, TS, etc.) were revised to reflect the subject modifications; the modifications were reviewed and incorporated into operations training programs as applicable; and post modification test requirements were specified and adequate testing performed.

• PCR 5899, Cavity Seal Ring Instrument Air Piping

The modification involved removing the instrument air regulator and the bottled nitrogen regulator and associated valves and fittings for the reactor cavity instrument air piping. This equipment was mounted on a movable cart. The cart mounted equipment will be installed when the reactor cavity seal is to be inflated. Flexible hoses with quick disconnects will be used to connect the cart into the instrument air system. The PCR allows testing and calibration of the components outside the containment prior to use in the system. Implementation of this modification was in progress during this inspection.

During review of this PCR and related documentation the inspectors noted that the cavity seal vendor manual specified that the seal should not be pressurized above 40 psig. Licensee procedure GP-009, Refueling Cavity Fill, Refueling, and Drain of the Refueling Cavity (Modes 5-6-5),



stated that the instrument air cavity seal ring supply relief valve setpoint should be verified to be between 40-45 psig. The inspectors questioned why the relief valve setpoint was set at a value that could potentially result in the cavity seal ring being pressurized to a value greater than the limit specified by the cavity seal vendor. Licensee personnel were unable to determine the basis for the relief valve setting stated in procedure GP-009. During further discussions licensee personnel stated that the relief valve setting would be changed to comply with the vendor's limit. PCR 5899 and procedure GP-009 were revised to reflect the change. Also, corrective maintenance procedure CM-M0074, Reactor Vessel Cavity Seal Assembly, Installation, and Removal was revised to document verification of the new setting for the relief valve. The inspectors considered the licensee's actions taken adequately resolved the weakness associated with this PCR.

• PCR 5939, Annunciator Setpoint Change to Support MCB Blackboard

The purpose of this PCR was to increase the main feedwater high flow alarm setpoint associated with flow through the main feedwater nozzles for all three loops. The modification involved increasing the setpoint and reset values to the main feedwater nozzle flow bistables to 3.53 MPPH and 3.49 MPPH, respectively. This control room alarm is designed to alert operators to excessive flow through the main feed nozzles which would increase the risk of tube vibration and wear in the preheater section of the steam generators. Following refueling outage three, operators were prevented from increasing feedwater flow to achieve 100 percent power due to spurious high main feedwater nozzle flow alarms. Following an analysis which showed that actual flow had not increased and that operating with the increased flow allowed by this change would not adversely affect the steam generator tubes, the PCR was approved and implemented.

This package contained a complete description of the modification and incorporated all post-modification testing as required. Additionally, the inspector verified that plant documents had been updated to reflect the setpoint change, and that qualified personnel had performed the safety reviews for this package. Although supporting vendor design review documentation was not available with the package onsite, the inspector verified that this information was available at the corporate level with the lead engineer. This plant modification demonstrated appropriate implementation of licensee design controls.

- PCR 6049 Essential Chiller Oil Foaming Trips

This modification consisted of changing the type of lubricating oil from York type "C" to York type "B" oil and lowering the low oil pressure trip point from 25 psid to 20 psid on essential services chilled water chillers 2WC-2(1A-SA) and (1B-SB). Historically these units have tripped on low lubrication oil pressure on startup. The pressure depression lasts about 14 seconds on system startup and is caused by the oil foaming action which occurs as a result of outgassing of absorbed refrigerant gas in the lubricant. The type "B" oil reduces the foaming and lowering the low pressure trip setpoint will avoid unnecessary tripping of these units during the starting cycle pressure transient.

The design package contained vendor concurrence with the resolution, changes to the plant setpoint document, changes to the vendor manual and changes to the plant instrument list. Post modification testing was also specified.

From review of the design package the inspectors concluded that an adequate safety evaluation and safety impact study had been performed.

- PRC 6064 Essential Services Chilled Water System (ESCWS) Pump P-7 Discharge Valve Upgrade

This modification replaced valves 1SW1079 and 1SE1232 in the ESCWS. These are ASME Section III safety related valves. Therefore the modification work is quality Q-class A. The original valves had carbon steel disks and bodies. Significant disk and seat corrosion and pitting was observed in these valves. The modification replaced the original valves with valves which have stainless steel disks and bodies. The PCR package contained a concise description of the problem, root cause, recommended resolution and alternative resolutions which were considered. Review of the PCR package showed that an adequate 10 CFR 50.59 safety evaluation and safety impact study had been performed. Post modification testing was specified in the design package and included flow testing, backflow and pressure testing. Additionally, preventive maintenance inspection was performed to record baseline information for the IST and check valve programs.

c. Configuration Control

The inspectors reviewed licensee activities associated with managing the configuration control program. The inspectors reviewed NED Guideline E-19, SHNPP Drawing Maintenance. This guideline provides the requirements for updating drawings.

Drawings are divided into Categories, A, B, C and D, with Category A being the most important, then B, C, and D. Recent NRC findings have indicated a weakness in the timeliness for updating some Category A drawings that were in the main control room. Subsequent licensee efforts have resulted in reducing the turnaround time for updating Category A drawings. The licensee has also worked toward reducing the drawing backlog in all categories. Licensee personnel stated that a corporate design documentation standard is being developed to improve the configuration management program. The site is developing an action plan to meet the corporate standard. One of the objectives of the corporate standard is to require that drawings critical to the operation and maintenance of the plant be updated prior to declaring a modified system operable, or within one month of receiving information that needs to be corrected. HESS management stated that operations and HESS personnel were in the process of determining the list of Category A drawings. Operations personnel have also identified a list of PCRs to HESS for implementation of the new corporate standard during the current refueling outage. The inspectors considered the new corporate standard on design documentation provides a good basis for enhancing the SHNPP configuration management program.

3. Organization and Staffing

The inspectors reviewed organizational changes and staffing levels to determine if the licensee is providing effective management and adequate resources to effectively accomplish the engineering functions. The HESS is part of NED.

Management and organization changes have been made with the HESS during the last 18 months to enhance the effectiveness of the engineering support functions. New Principal Engineers were assigned to the mechanical and civil disciplines. The Principal Engineer for the mechanical discipline has a SRO and 14 years of operations experience. Other engineers with operations experience have been added to HESS. These additions to the HESS staff are positive examples of ongoing licensee efforts to enhance the communication and cooperation between the plant and engineering, and to broaden the operations perspective within HESS.

The staffing level within HESS was sufficient to support the design changes for the 1992 refueling outage which is currently in progress, and the PCRs that were implemented between the 1991 refueling outage and the 1992 refueling outage. The HESS staff was reduced from 150 personnel in 1991 to the current level of 130. The reductions were in contract personnel. The current staff consists of 90 CP&L engineers, 30 contract engineers, and 10 administrative personnel. Licensee management stated that additional contract personnel are brought in to supplement the HESS staff during increases in workload. The reductions in staff over the last year did not change the effectiveness of HESS's



outage related efforts. The initial list of PCRs identified to HESS were all completed by the April 1, 1992 due date.

In addition to reviewing the HESS organization, the inspectors also reviewed the training being provided to engineers within HESS. The training program is addressed in NED Guide 2.2, NED Training. The training program has focused on training such as design verification, QA codes and standards, and supervisory training. The Principal Engineers are developing a more comprehensive technical training plan for their disciplines. Licensee personnel stated that INPO has issued guidelines for various engineering support personnel, one of which is for modification engineer. HESS is developing qualification and certification guides for the various disciplines based on the INPO modification engineer guideline. The HESS guides are scheduled to go into effect in early 1993. Licensee personnel stated that the goal is to devote approximately six percent of an engineer's time to training. The inspectors concluded that the efforts by the licensee to enhance the training program for the NED staff in general, and the HESS staff in particular should provide positive results.

4. Self Assessment

The inspectors discussed the self assessment program with Harris NAD personnel and reviewed portions of the corrective action program, procedures, and assessment reports for the NED and modification. NAD performs assessments of corporate and all the CP&L plants in various safety related areas on a scheduled, periodic basis. The findings from these assessments are generally categorized as strengths, issues, and weaknesses (i.e. items for management consideration). The guidelines used in assessing the findings are the INPO documents: 1) Performance Objectives and Criteria for Operating and Near Term Operating Licensee Plants (INPO 90-015, August 1990), and 2) Guidelines for the Conduct of Design Engineering (INPO 90-009, February 1992). The assessment report C-NED-92-01 dated September 14, 1992 indicated that NED performance was generally adequate. No "issues" were identified. However, a number of discrepancies were identified and categorized as "Items for Management Consideration" (i.e. weaknesses).

These weaknesses included items from NED corporate and all CP&L plants such as:

- Failure to update the EDBS
- Backlog of Category C (non-critical) drawings, other category B design documents, and modification exceptions which were overdue for update or revision.
- Failure to adequately understand and verify design supplied by vendors.
- Failure to address mechanical equipment qualification in five PCRs released for implementation.



- Failure to do stress analysis for two of eight replacement valves and update the replacement in the EDBS.

The above items, although not all inclusive, characterize the nature of NAD's assessment of NED performance and were identified as weaknesses in configuration management.

Results section of the assessment report stated that no response to the findings was required. Processing of assessment findings was discussed with NAD personnel. A finding of a "strength" is self evident. A finding of an "issue" indicates a condition adverse to quality. For "issues" an ACR must be written. This ensures that the matter receives proper engineering and management level review and root cause determination. Also, the matter is captured in the CAP where corrective actions are identified and tracked to completion. Findings classified as "Items for Management Consideration (weaknesses)" are not required to be formally tracked and closed by NAD. Also a response to these weaknesses from the plants or corporate NED specifying corrective action and a time for completion is not required. In response to the inspectors' request for clarification concerning the above process, the licensee indicated that weaknesses were retained in a computerized data file for one year. When an assessment is to be performed the file and previous report (for the area to be assessed) are reviewed during preparation for the assessment and previously identified weaknesses are highlighted for further review. These, however, are not formal program requirements.

In review of the assessment findings the inspectors concluded that at least some of the weaknesses were reasonably significant and merited a response identifying corrective actions, time for completion and formal tracking for management control and oversight purposes.

Some examples of findings considered to have a reasonable level of significance are:

- Failure to maintain the EDBS up to date. The EDBS is the source of certain design information that is necessary for maintenance, procurement and design functions. Lack of accurate up to date design information increases the difficulty in performing these functions, reduces productivity, and increases the likelihood for making errors.
- Modification Exceptions backlog includes exceptions involving calculation review and/or update which are assigned to NED. Nineteen of the exceptions are greater than one year old. The assessment indicated that the age and unknown impact of these exceptions increases the potential for design inaccuracies.
- An engineering evaluation authorized replacement of eight 16-inch valves in a safety related system. Stress analysis supporting valve replacement was not performed for two of the eight valves. Additionally, the EDBS indicated that the replaced valves were



still installed. Appropriately, an ACR was written for this problem but the matter was not identified as an "issue".

At the exit interview the inspectors stated that the lack of formal requirements to respond to NAD on identified weaknesses and formal tracking and closure of corrective action for these problems will be IFI 50-400/92-21-01.

In addition to NAD assessments, NED has established its own program for quality control, corrective actions, and self assessment. A Nuclear Assessment Unit within the Harris Engineering Support Section performs the internal assessment function for all of NED. This group performs assessments of NED performance based on INPO 90-009 guidelines and in accordance with a NED Self Assessment assigned area and schedule. The inspectors reviewed a memorandum from this group to the NED Manager dated July 31, 1992 and noted recommendations for improving NED procedures, participation in Root Cause Investigations, and the use of industry experience during the investigation of adverse conditions.

In addition to the self assessment efforts within NED, site groups also meet with HESS management to provide feedback on the quality of work performed by HESS. These groups include the Modification Support Services Subunit and the Modification Management Subunit. These site groups provided comments and feedback on the quality of PCR packages, field revisions to PCRs, and field implementation problems. The meetings are held monthly to discuss PCR comments and their resolution. This interface and communication between HESS and the plant has resulted in the reduction of comments to PCRs. The inspectors reviewed trend data which showed a significant decrease in the number of comments to PCRs over the last 18 months. The inspectors considered this to be a positive example where the communication between the plant and HESS resulted in an improvement in the quality of work provided by HESS.

Violations or deviations were not identified in the areas inspected.

5. Exit Interview

The inspection scope and results were summarized on September 18, 1992, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee. Inspector followup item 50-400/92-21-01, response to weaknesses in NAD audit reports was discussed.

6. Acronyms and Initialisms

ACR	Adverse Condition Report
CAP	Corrective Action Program
CP&L	Carolina Power and Light
EDBS	Equipment Data Base System
ESCWS	Essential Services Chilled Water System

FSAR	Final Safety Analysis Report
HESS	Harris Engineering Support Section
HPAS	Harris Project Assessment Section
INPO	Institute of Nuclear Power Operation
MCB	Main Control Board
NAD	Nuclear Assessment Department
NED	Nuclear Engineering Department
O&M	Operations and Maintenance
PCR	Plant Change Request
PRG	Plant Review Group
PSIG	Pounds per Square Inch Gauge
QA	Quality Assurance
SHNPP	Shearon Harris Nuclear Power Plant
SRO	Senior Reactor Operator
TS	Technical Specifications