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

Report Nos.: 50-321/85-13 and 50-366/85-13

Licensee: Georgia Power Company
P. O. Box 4545
Atlanta, GA 30302

Docket Nos.: 50-321 and 50-366 License Nos.: DPR-57 and NPF-5

Facility Name: Hatch 1 and 2

Inspection Conducted: April 29 - May 3, 1985

Inspector: W. J. Ross 5/17/85
W. J. Ross Date Signed

Approved by: J. J. Blake 5/21/85
J. J. Blake, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection entailed 38 inspector-hours on site in the areas of plant chemistry and inservice inspection of pumps and valves.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*H. Nix, General Manager - Plant Hatch
*P. Fornel, Manager, Quality Assurance
*C. T. Jones, Manager, Engineering
*T. A. Seitz, Manager, Maintenance
*L. Sumner, Manager, Operations
B. Arnold, Lab Supervisor - Health Physics (HP)/Chemistry
T. Beinke, Operations Supervisor on Shift
E. Burkett, Inservice Inspection Engineer
*B. Duvall, HP/Chemistry Engineer
R. Huber, Inservice Inspection Engineer
W. Kirkley, Engineer Supervisor, HP/Chemistry
V. McGowan, Laboratory Supervisor, HP/Chemistry
*W. H. Rogers, Superintendent, HP/Chemistry
L. Wimberly, Engineer, HP/Chemistry

Other Organization

M. Belford, Southern Company Services

NRC Resident Inspector

*P. Holmes-Ray

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 3, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Plant Chemistry (92706)

During an earlier inspection (Inspection Nos. 50-321, 366/84-06) the inspector observed that the integrity of both the reactor fuel cladding and the reactor coolant system were being imperiled by chemical-induced corrosion. The licensee was actively attempting to resolve these problems through repair or replacement of degraded piping in the Recirculation Water System and improvement of chemistry control of the quality of feedwater/ reactor water. This followup inspection consisted of an assessment of the licensee's actions in these areas during the past year.

a. Reassessment of Plant Design and Operation

This inspection coincided with a refueling outage for Unit 2. This unit had been down during the first half of 1984 while cracked sections of the Recirculating Water piping were being replaced and then had returned to power for an abbreviated fuel cycle that terminated on April 5, 1985. The inspector was informed that all degraded fuel elements had been removed from the core prior to startup in August 1984, and no evidence of further failure had been observed during the current outage. The next core loading is designed for a 15-month fuel cycle.

Unit 1 operated until September 30, 1984 and was restarted in January 1985. During the interim refueling outage, indications of intergranular stress corrosion cracking in the heat affected weld zones of the Recirculating Water piping were repaired by weld overlays.

Through an audit of plant records and discussions with plant personnel the inspector reassessed the extent to which control of reactor water chemistry was affected by the design and operation of the systems that are discussed below.

(1) Integrity of the Condenser

During its nine-month fuel cycle in 1984, Unit 1 experienced a number of short, as well as long (two to five weeks), outages that complicated the control of reactor water chemistry. However, soon after each restart, the conductivity of the water in the condenser hotwells dropped to ~0.06 umhos/cm - indicating that there was no inleakage of condenser cooling water when the condenser was under vacuum. Air inleakage remained high, 25-30 SCFM; consequently, the licensee has an on-going program to identify and repair the sources of air leaks. The operational experience of Unit 2 was similar in that approximately ten short power outages occurred during the abbreviated fuel cycle, and inleakage during plant operation was maintained at 19-26 SCFM of air and essentially no condenser cooling water, i.e., the conductivity of water in the water boxes of this unit remained <0.06 umho/cm.

Analyses of hotwell water show that copper continues to be removed from the admiralty brass condenser tubes, as both soluble and insoluble species. As will be discussed later, the licensee is directing considerable effort to preventing copper from being transported to the reactor where it tends to plate out on the fuel elements and results in degradation of the fuel element cladding.

(2) Condensate Makeup System

During the past year the licensee has initiated two design changes to the Demineralized Water Storage Tank (DST) to minimize the amount of dissolved oxygen that is added to the reactor coolant in the condensate makeup water. One change will allow the effluent of the water treatment plant to enter the DST from the bottom, thereby, minimizing contact of the water with any air that may be in the top of the tank. Also, the licensee is experimenting with a floating ball system as a barrier between the water in the DST and air that is in the upper regions of this tank to determine if absorption of oxygen by the water can be minimized.

(3) Condensate Polishers

During the previous inspection the inspector had observed that the licensee was attempting to improve the effectiveness of the filter/demineralizer (Powdex) condensate cleanup system with the dual goals of increasing the separation factor for copper and extending the useable life of the filter/dimineralizer elements (and, also decrease the volume of solid and liquid radwaste). [Inspector followup item 84-06-01]. The inspector was informed that, in addition to the air surge backwash procedure discussed in the previous inspection report, the following changes have been made to the condensate cleanup system:

- all seven polisher vessels are now being used routinely, rather than only six as previously used during 100% condensate flow.

- "Ecodex" resin (ion-exchange resins with an inert filter media) is now used to coat the filter elements rather than powdex".

- the precoating procedure has been modified to decrease the rate of resin addition in an effort to improve the quality of the resin layer.

In addition, the licensee is considering initiating a 'body-feed' technique, currently used at some European plants, to extend the useful life of an element. This procedure consists of continuously applying fresh resin to the filter/demineralizer elements without removing the underlying coats.

A review of data obtained from analyses of the polisher effluent and feedwater in Unit 1 during operation in 1984 showed that the chemistry control parameters were maintained at the following levels:

Conductivity - 0.057 to 0.060 umho/cm
Chloride - < 10 ppb
Silica - 30-80 ppb
Oxygen - 20-30 ppb
Copper (soluble) - ~0.2-0.6 ppb
Copper (insoluble) - <0.2 ppb
Iron (soluble) - 0.02-0.2 ppb
Iron (insoluble) - 0.3-1.0 ppb

These values are close to the limit of detection, especially for copper and iron using atomic absorption methodology, and indicate that separation factors of ~10 are being achieved with he condensate cleanup system at these low concentrations. Even more efficient separation has been obtained with "Suprex" brand resin. This resin was recommended by European consultants and is now used in the Reactor Water Cleanup System; however, the useable life of the condensate polishers was decreased to an unacceptable extent when Suprex was substituted for Ecodex.

(4) Feedwater Piping, Heaters and Drains

The high quality of both the feedwater and the hotwell water indicates that there is very little transport of soluble or insoluble corrosion products from the feedwater heater drains, as well as from the extraction steam lines and moisture separator reheater drains. The licensee attributes the absence of larger concentrations of iron, copper, and zinc and their oxides to the efficiency of the startup cleanup procedure (HNP-7632). After a lengthy outage, cyclic cleanup of the condensate, through the condensate polishers, is begun ~ 14 days before power ascension is initiated. Inasmuch as the Hatch units are not designed to pump feedwater heater drains forward to the feedwater pump (i.e., bypassing the condensate polishers), the licensee uses the quality of the hotwell water to monitor the cleanliness of the high pressure steam and water lines when the plant is at power.

(5) Reactor and Reactor Water Cleanup System

As the result of efforts dedicated to providing high quality feedwater in Unit 1, the conductivity of the feedwater during the 1984 fuel cycle (No. 8) was <0.2 umhos/cm twenty-five percent of the time and <0.3 umhos/cm ninety-five percent of the time. During the previous fuel cycle (No. 7) these conductivities were achieved only five percent and seventy percent of the time that the unit was at power. This improvement is attributed in part to

increased efficiency of the Reactor Water Cleanup (RWCU) System resulting from three factors:

- increased reliability of the RWCU pumps
- increased RWCU flow (125 gpm rather than 100 gpm)
- substitution of Suprex for Ecodex ion exchange resins in the RWCU demineralizers

One consequence of this improvement is that the conductivity of the reactor water is within the 0.3 umho/cm limit recommended by the Electric Power Research Institute (EPRI) to minimize intergranular stress corrosion cracking (IGSCC) of sensitized regions of stainless steel Recirculating Water lines. (During the previous inspection, the licensee informed the inspector that several cracked weld regions had been removed and were to be analyzed to establish the cause of cracking. However, the results of these tests did not contribute any information relative to the role of chemistry in this type of cracking - Inspector Followup Item 84-06-03.)

Through the use of Suprex ion exchange resin in the RWCU demineralizer, the concentration of copper in the reactor water of Unit 1 was decreased somewhat during the last fuel cycle. However, the concentration still varies from 20 to 35 ppb and is still considered to be potentially detrimental to the integrity of the fuel cladding. Consequently, the licensee is continuing the R&D program to completely prevent the transport of copper through the condensate polishers. [Inspector Followup item 84-06-02]

(6) Low-Pressure (LP) Turbine Rotors

The inspector was informed that, on the basis of a schedule developed by the LP turbine vendor, the LP turbines of Unit 2 were inspected in 1982 and would not be inspected again until the refueling outage in 1986. To date no indications of bore or keyway cracks have been observed in this unit. Cracks have been observed, however, in the wheels of Unit 1 LP turbines, and one wheel has been replaced. Also, since indications were found in other wheels, the licensee has acquired eight new wheels and will replace any wheel that is declared to be unsafe during the next (the next refueling outage) inspection. The inspector was also informed that the vendor has been performing analyses of the steam quality; however, the results of these analyses were not known to the licensee. [Inspector Followup Item 84-06-04]

(7) Summary

As the licensee plans to initiate longer (15 month) fuel cycles, the inspector observes that considerable attention and resources

are being devoted to producing even higher quality feedwater/ reactor water to eliminate further degradation of fuel elements through copper-associated corrosion mechanisms. During the past year prevention of ingress of contaminants has been achieved and some improvement in the useful life of the condensate polishers has been accomplished. The licensee believes that both the separation factors for trace concentrations of anions and cations and the run time of a filter/demineralizer element will be further enhanced by the 'body-feed' coating technique.

b. Reassessment of the Licensee's Water Chemistry Program

During his last inspection, the inspector perceived several apparent inconsistencies in the manner with which Procedure HNP-7500, Water Quality Limits and Procedure HNP-7633, Primary Coolant Sampling Program were being implemented. The inspector was concerned that the Hatch water chemistry program was not adequately defined [Inspector Followup Item 84-06-05]. In the interim, the licensee has established the scope of the program in a new Administrative Procedure, Plant Sampling and Monitoring Program. The 'objective' of this new procedure states that the procedure "establishes the requirements and responsibilities for the Plant Sampling and Monitoring Program. It includes criteria for monitoring fluid systems, maintenance of water quality, and limiting conditions for operations." The guidance in this document will be used to implement the requirements of the FSAR and pertinent Technical Specifications and is consistent with guidelines recommended by the BWR Owners Group (BWROG) and EPRI. From discussions with members of plant management and the supervisory staff of the Health Physics/Chemistry Department it was evident to the inspector that these requirements and responsibilities were established as the result of a clear understanding, at all levels, of the importance of chemistry control. The inspector believes that when this document is fully implemented most of his concerns related to the Hatch water chemistry program will be resolved.

During the past year the licensee has hired a Plant Chemist and sufficient chemistry technicians to staff six shifts (i.e., six foremen and 30 technicians) without contract personnel.

The inspector reviewed the most recent revision (Revision 9, February 1985) of the licensee's Water Chemistry Improvement Program. This open-ended planning document describes areas where additional research and development emphasis is needed and assigns responsibilities to members of the Engineering Section of the HP/Chemistry Department for achieving specified goals. The inspector discussed, in depth, the status of several of these goals with the cognizant engineers and observed that significant effort is being devoted to the improvement program.

The inspector also observed that the licensee has acquired state-of-the-art analytical instruments (an atomic absorption spectrophotometer and an ion chromatograph) for use in monitoring trace levels of impurities in the reactor coolant and other fluid systems. These instruments are located in an environmentally controlled laboratory but are not yet fully operational.

The inspector was informed that additional sampling points are being installed in the condenser hotwell so that the source of condenser water inleakage can be detected and isolated in minimum time. This action is considered to be consistent with the recommendation of the SGOG/EPRI Guidelines that corrective action be taken in a timely manner whenever an abnormal chemistry event occurs.

The inspector reviewed the licensee's data management program and established that all chemistry control parameters are being trended (manually and with a computerized data base), so that both short and long term transients can be readily recognized and diagnosed.

As the result of this part of the inspection no deviations or violations were identified.

6. Inservice Inspection of Pumps and Valves (92706)

As a followup of previous inspections (Inspection No. 50-321, 366/83-08 and 84-06) the inspector reviewed the following aspects of the licensee's program for meeting the requirements of subsections IWP and IWV Section XI of the ASME Code.

- Development of a program for the second 120 months of operation of the two Hatch units
- Records and analysis requirements (IWP-6000 and IWV-6000)

a. Program for Inservice Testing (IST) of Pumps and Valves

The inspector held discussions with the Hatch ISI Engineer and a member of the Southern Company Services ISI Department relative to the NRC's review of the licensee's initial IST program and the licensee's development of an IST program for the second 120-month operating period. These discussions focused primarily on the licensee's requests for relief from Code requirements and the NRC staff's interpretation/position related to test reference values for pumps and valves. The licensee requested that the inspector assist in seeking expeditious release of the NRC staff's safety evaluation of the initial 120-month IST program, and associated requests for relief from Code requirements, so that staff positions might be factored into the development of the second 120-month IST program. The inspector subsequently contacted the NRR Project Manager for Hatch in this matter.

b. Maintenance of Summary Listings

The licensee's initial 120-month IST program was developed to comply with ASME Section XI, 1980 edition with addenda through Winter 1980. Paragraphs IWP-6210 and IWV-6210 of this edition require the licensee to maintain lists of pumps and valves to record the current status of the test programs. The inspector interprets these requirements as ensuring that the licensee stays current on the scheduling of pump and valve tests and is aware of the capability of each component to perform its designed function. Through discussions with the ISI engineer and Operations personnel and audits of pertinent test logs the inspector assessed the licensee's procedures for implementing the requirements of IWP-6210 and IWV-6210.

The inspector was informed that responsibility for implementing IWP-6210 was divided among several System Engineers in the ISI Section of the Engineering Department. Each System Engineer is on the distribution list to receive the completed test packages associated with tests of pumps in plant systems under his responsibility. All test data are maintained in a manner that allows the cognizant System Engineer to establish if pump parameters are outside specified limits or exhibit a trend that indicates possible degradation of the pump.

The Summary List for valves is maintained by the ISI Engineer and consists of a log of surveillance tests, listed by procedure rather than by individual valves, with notations as to whether the results were satisfactory or further action was required. The actual numerical test results, for both pumps and valves, are recorded by Operations personnel, who perform the tests, in log books that are maintained in the Control Room. The inspector was informed that the operator/tester refers to the data in the Pump and Valve Books after each test to determine if the most recent test results are acceptable; however, these data are normally not used either by Operations personnel or by the ISI Engineer, to monitor short or long-term trends.

The inspector audited test data in the Unit 2 Pump Book relative to two RHR pumps (2E11-C002A and C002B), two Plant Service Water Pumps (2P41-C001A and C001B) and one Core Spray Pump (2E21-C001B). This audit was designed to determine the extent to which the operating parameters of these pumps had been outside of specified reference limits during the operational history of this unit. During this period each pump had been tested ~30 to 35 times.

As a result of this audit the inspector established that one test result (pump flow-rate for pump 2P41-C001A) had dropped below the reference level, and approximately three percent of the differential-pressure results for four of the pumps were higher than the reference limit. An accurate assessment of the tests results for pump 2P41-C001B could not be made because the reference value for flow rate had been changed three times and the pump had been rebuilt during this period.

The results of this audit were discussed with the licensee to demonstrate that the allowable ranges of test quantities set by the Code (Table IWP-3100-2) are usually being met. Consequently, the need for the licensee's request for relief from the Code's reference limits should be further reviewed prior to the submittal of the second 120-month IST program.

No violations or deviations were identified during this part of the inspection. However, the inspector does not believe that the intent of the Code requirement for Summary Lists is being fully accomplished or that maximum value is being derived from test results because the information itself and the responsibility for the analysis of test data is dispersed between two departments (Operations and Engineering) as well as among several System Engineers. Also, the inspector believes that the valve list would be of greater value if it listed individual valves rather than procedures that may pertain to a large number of valves. Finally, it appeared to the inspector that no one has the responsibility for trending valve stroke times to verify that a valve is not degrading. Valve Summary Lists are widely used for this purpose by including the numerical test values in the description of test results.

7. Inspector Followup Items

(Closed) Inspector Followup Item 84-06-01, Modification of Condensate Polisher Resin (Section 5.a.(2))

(Closed) Inspector Followup Item 84-06-02, Resolution of the Causes of Fuel Degradation (Section 5.a)

(Closed) Inspector Followup Item 84-06-03, Role of Chemistry in the Cracking of Recirculating Water Pipes (Section 5.a(5))

(Closed) Inspector Followup Item 84-06-04, Indications on Low-Pressure Turbine Wheels (Section 5.a.(6))

(Closed) Inspector Followup Item 84-06-05, Format of Water Chemistry Program (Section 5.b)