U.S. NUCLEAR REGULATORY COMMISSION
REGION I

REPORT/DOCKET NO. 50-354/92-19

LICENSE NO. NPF-57

LICENSEE: Public Service Electric and Gas Company
Post Office Box 236
Hancocks Bridge, New Jersey 08038

FACILITY NAME: Hope Creek Generating Station

INSPECTION AT: Hancocks Bridge, New Jersey

INSPECTION DATES: November 4 - 10, 1992

INSPECTOR: E H Gray for J.C. — 12/16/92
J. Carrasco, Reactor Engineer, Materials Section, EB, DRS — Date

APPROVED BY: E H Gray — 12/16/92
E. Harold Gray, Chief, Materials Section, Engineering Branch, DRS — Date

Areas Inspected: A safety inspection was conducted to assess the licensee's corrective action for the mechanical snubbers that failed the functional test, to verify that the failed snubbers were replaced or restored to their as-designed condition prior to plant startup, to review the inservice inspection (ISI) snubber program, and to assess the snubber reduction program.

Results: Based on the present inspection, it was concluded that the licensee restored the mid-size failed snubbers in accordance with requirements established in the technical specifications. The 19 deficiency reports (DRs) for these snubbers were properly and timely dispositioned by engineering, including the prompt review and closure of the DRs by the quality assurance group. These efforts enabled the licensee to restart the plant with pertinent snubbers operable and properly installed.

The licensee's procedure for performing visual examinations of mechanical snubbers, hydraulic snubbers, and compensating struts was found technically adequate.

The snubber functional test was conducted with state-of-the-art technology in a controlled environment and by qualified individuals. The record keeping of these tests (visual and functional snubber tests) were found to be computerized, complete, and in compliance with the Technical Specification.

The snubber reduction program is being performed in accordance with an established methodology provided in the FSAR.

ISI SNUBBER PROGRAM AT HOPE CREEK GENERATING STATION

1.0 BACKGROUND

Snubbers are restraining devices used to control the movement of pipe and equipment during abnormal conditions such as seismic events, turbine trips, safety/relief valve discharge, and rapid valve closure. Snubbers permit displacement of the pipe as a result of slow movements such as thermal expansion, but restrain rapid motions such as those induced by earthquakes and water hammers. However, while snubbers present convenient solutions in design and analysis, the use of snubbers has proven to have many practical and economic disadvantages. Malfunction of snubbers in the lockup mode during normal plant operation has created unanticipated high pipe thermal stresses. Because of these hardware problems, snubbers have high maintenance costs that include meeting inservice inspection and testing requirements. Industry experience has shown that piping systems often have more snubbers than are actually required for protecting the piping from earthquakes.

Although there is no NRC requirement in regard to snubber reduction, licensees are undergoing extensive snubber reduction programs to enhance safety, reliability, and efficiency of piping systems.

This inspection focused on the fact that several mid-size mechanical snubbers failed the acceleration and the drag functional tests during this outage at Hope Creek Generating Station.

2.0 PURPOSE AND SCOPE OF THE INSPECTION

The purpose of this inspection was to assess the licensee's corrective action for the mechanical snubbers that failed the functional test, to verify that the failed snubbers were fixed and restored to their as-designed condition prior to the restart of the plant, to assess snubber reduction program, and to review inservice inspection (ISI) snubber activities.

3.0 FINDINGS

3.1 Review of Corrective Action for Failed Snubbers

The inspector reviewed the snubber inspection schedule and sampling procedures, and verified their conformance with the technical specifications (TS). The inspector verified that the NRC was notified of the snubber testing sampling plan, as properly documented in the licensee's letter to the NRC, dated May 18, 1988.

The licensee's snubber inspection plan is the following:

TYPE	TOTAL POPULATION	PLAN	QUANTITY OF SAMPLE
Compensating Strut	9	10%	1
Hydraulic	50	10%	5
Mechanical Large	346	10%	35
Mechanical Midsize	620	55	55
Mechanical Small	158	10%	16

Upon failure of 19 mid-size snubbers, the licensee expanded the population to 536. The inspector verified that the expansion of the population was done in accordance with the formulation outlined in the technical specification. Ultimately, the licensee decided to perform a functional test for 100% of the population or the 620 mid-size snubbers. No more failures were reported.

The inspector verified that the 19 snubber failures were properly documented on Deficiency Reports (DRs) and were properly dispositioned and closed before the restart of the plant. In addition, a representative sample of DRs with its associated calculations were discussed indepth with the licensee's engineering group. These were DR No. HMT-92-131 and DR No. HMT-92-191, corresponding to snubbers 1-P-BC-069-H011, for system BC or the Residual Heat Removal (RHR) and 1-P-AE-054-H010(B), for the AE or Feedwater System (FWS).

DR No. HMT-92-131 for Snubber 1-P-BC-069-H011 stated that during the functional testing, this snubber would not stroke in tension or compression. Upon opening the snubber for internal examination, dry grease was found in the capstan spring and inside body grooves in the thrust bearing. An engineering evaluation of the affected stress calculation was performed. This assessment considered the effect of the failed snubber, and it was concluded that the piping system was operational within design margins during the snubber lock-up.

DR No. HMT-92-191 was prepared to document the failure details of snubber 1-P-AE-054-H010(B). In this case, it was documented that the snubber's internals were found broken and not able to stroke. Based on this finding, it appeared that overloading conditions were the cause of the failure. Since the snubber in question was frozen, the stress calculation was performed assuming a rigid restraint for all thermal loads. The results of this evaluation showed that stresses are within code allowables. Therefore, it was concluded that the locked up snubber had no impact on the structural integrity of the piping system and associated supports.

During the review of the engineering disposition of the 19 DRs addressing the failed snubbers, the inspector noticed that the engineers were not fully familiar with the table that equates the original system designator with the standard piping system designator. For example, the feedwater system (FWS) corresponds to designation AE and (RHR) system is designated as BC. The inspector expressed this observation as a weakness. The licensee acknowledged the weakness, and stated that the training to enhance the engineers proficiency in using the piping systems designator table will be evaluated.

Conclusion

Based on the assessment described above, the inspector concluded that the licensee handled the 19 mid-size failed snubbers in accordance with requirements established in the plant technical specifications. The 19 DRs were properly and quickly dispositioned by engineering, including the prompt review and closure of the DRs by the quality assurance group. These efforts enabled the licensee to restart the plant with the pertinent snubbers operable and properly installed.

3.2 Review of Procedure For Visual Examination of Snubbers

The inspector reviewed the licensee's Procedure No. SH.SS-1S.ZZ-0104(Q), Revision 2. This document was developed to provide a procedure for performing visual examinations of mechanical snubbers, hydraulic snubbers, and compensating struts to determine the general mechanical and structural conditions of the components and their supports. To determine the technical adequacy of the procedure, the inspector observed the visual examination of snubbers performed by a licensee level II ISI snubber inspector. The visual examination data of randomly selected Hanger Nos. 1-P-BH-011-H002 and 1-P-BH-011-H003 were recorded on the computer generated form M9-IIP-05H, Revision 2. This form has the basic data already preprinted with information such as hanger number, room no. or designation, location/elevation, temperature, radiation level, and accessibility. The examination section of the inspection form has listed the inspection attributes, such as a determination as to whether the snubber is free of debris, heavy rust, distortion, cracks; if the fasteners are satisfactory, if the snubber is able to rotate, and if the stroking position is set per the details shown on the applicable drawing.

Each snubber was examined using the detail design drawing for the attributes listed above and the results recorded on the data sheet. The inspector verified the accuracy of the examination data by referring to the acceptance criteria outlined in section 5.2 of the snubber visual examination procedure.

Conclusion

Based on the review of the licensee's procedure No. SH.SS-1S.ZZ-0104(Q), Revision 2, for performing visual examinations of mechanical snubbers, hydraulic snubbers, and compensating struts, and on the walkdown of selected snubbers, the inspector concluded that the procedure is technically adequate and that the observed visual examinations performed by the licensee's level II ISI snubber inspector were adequate and in accordance with the procedure.

3.3 Review of Procedure for Functional Examination of Snubbers

The inspector walked through the functional testing facility and observed the functional test in progress for some of the mechanical snubbers. In the testing facility, the inspector interviewed the responsible personnel to understand and evaluate details of these tests. In addition, the inspector reviewed procedure SH.SS.1S.ZZ-0105(Q), Revision 1. This procedure implements the Technical Specification for Hope Creek, section 4.7.5, which addresses the surveillance of snubbers, and the administrative control of snubber test data.

The inspector observed the functional test for snubbers, consisting of drag and acceleration tests. These tests were conducted with state-of-the-art technology in a controlled environment and by qualified individuals. The test report is generated on form No. SH-SS-1S.ZZ-0106(Q), ready to be signed by the level III responsible reviewer upon completion of the form. Breakaway drag, initial running drag, acceleration limit, and final running drag test were recorded and compared with the acceptance criteria. These test results were also illustrated by plots at very small time intervals.

The inspector verified that the record of snubber service life monitoring pursuant to Technical Specification 4.7.5 was properly recorded and was in accordance with section 6.0 of the technical specification (administrative control section). The data recording was accomplished by using a computer program named TRISIC (Tracking of In-Service Inspection of Components). This computer program is in compliance with ASME Section XI. TRISIC is a software package that was customized for Hope Creek Generating Station, and which precisely conforms to the technical specifications, procedures, and specific needs of the plant.

Conclusion

Based on the review of the functional test of piping system snubbers, the inspector concluded this test is conducted with state-of-the-art technology in a controlled environment by qualified individuals. Additionally, the record keeping was found to be computerized and in compliance with the technical specification.

3.4 Hope Creek Snubber Reduction Program

The total snubber population (safety and non-safety related) at Hope Creek is 1,237 snubbers; 1,186 are within the ISI program. Of these, 832 snubbers were selected from the ISI population for snubber reduction evaluation.

These 832 snubbers can be divided into three groups: 261 are on the main steam and recirculation piping within the drywell and the connecting Residual Heat Removal (RHR) Safety Relief Valves (SRV) piping, 202 are on piping directly attached to the torus suppression chamber subjected to the Plant Unique Analysis (PUA) for condensation oscillation and suppression pool chugging as a result of SRV discharge, and 369 are on other safety significant piping inside and outside the drywell.

The inspector verified that the analytical approach complied with the ASME Code Case N411, "Alternative damping Values for Response Spectra Analysis for Class 1, 2, and 3 Piping, Section III, Division I," used by the licensee for the snubber reduction program. This is in accordance with the approved design bases, as prescribed in their FSAR in section 5.2.1 and table 5.2.2.

Conclusion

Based on the assessment described above and the discussions with the licensee's structural/mechanics group, the inspector concluded that the licensee is approaching the snubber reduction program in accordance with established methodology as provided in the FSAR.

4.0 MANAGEMENT MEETINGS

Licensee management was informed of the scope and purpose of the inspection at the beginning of the inspection. The findings of the inspection were discussed with the licensee management at the November 10, 1992, exit meeting. See Attachment 1 for attendance.

ATTACHMENT I

PERSONS CONTACTED

Public Service Electric and Gas Company

* J. Hagan, General Manager, Hope Creek (HC) Operations
  J. Ranalli, Nuclear Mechanical Engineer Manager
  D. Longo, Principal Engineer, Stress Group
  S. Ketcham, Principal Engineer, Mechanical Group
* D. Smith, HC License Engineer
* N. Mistry, Stress Engineer
* W. Treston, Site Service ISI
* J. Morrison, Manager, Site Services
* B. Hall, HC Technical Manager
* R. Hovey, Manager of Operations, HC
* F. Ricart, Safety Review Engineer

U.S. Nuclear Regulatory Commission

* E. H. Gray, Section Chief, Region I
* K. Lathrop, Resident Inspector, HC

* Denotes those present at the exit meeting.