U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-354/82-09

Docket No. 50-354

License No. CPPR-120 Priority -- Category A

Licensee: Public Service Electric and Gas Company

80 Park Plaza - 17C

Newark, New Jersey 07101

Facility Name: Hope Creek Generating Station, Unit 1

Inspection at: Hancock's Bridge, New Jersey

Inspection conducted: August 2 - September 6, 1982

Inspectors: W.H. Bateman 9/9/82
W. H. Bateman, Senior Resident Inspector date signed

date signed

date signed

Approved by: L.E. Tripp 9/16/82
L. E. Tripp, Chief, Projects Section 2A date signed

Inspection Summary:

Unit 1 Inspection of August 2 - September 6, 1982 (Report No. 50-354/82-09):

Areas Inspected: Routine unannounced safety inspection by the resident inspector (91 hours) of work in progress including installation of bioshield lateral trusses, service water pipe trench excavation and backfill, concrete placement and curing, filler metal control, RPV internals installation, pipe and hanger installation, storage of materials and equipment, housekeeping, polar crane assembly, diesel generator installation, structural steel erection, HVAC duct and support installation, and expansion anchor bolt installation. The inspector also made tours of the site, evaluated licensee action on previous inspection findings, reviewed records pertaining to lateral truss fabrication and CRDM housing NDE, investigated NCR trending program, inspected implementation of Field Change Notice program, and witnessed action taken by the licensee to resolve a construction deficiency report.

Results: No items of noncompliance were identified.

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DETAILS

1. Persons Contacted

Public Service Electric and Gas Company (PSE&G)

A. Barnabei, Principal Staff QA Engineer
R. Bravo, Principal Construction Engineer
A. E. Giardino, Project QA Engineer
P. Kudless, Project Construction Manager
G. Owen, Principal Construction Engineer

Bechtel Power Corporation (Bechtel)

A. J. Bryan, Project QC Engineer
W. Dorman, Assistant Project Field Engineer
M. Drucker, Lead Site QA Engineer
R. Hanselman, Lead Welding Engineer
M. Henry, Project Field Engineer
R. Mackey, Resident Project Engineer
J. R. McCoy, Lead Contracts QC Engineer
G. Moulton, Project QA Engineer
J. Pfeiffer, Assistant Project Construction QC Engineer
D. Sakers, Assistant Project QC Engineer
J. Serafin, Assistant Project Field Engineer
D. Stover, Project Superintendent, Contract Administration

General Electric Installation and Services Engineering (GEI&SE)

R. Burke, Site Project Manager
M. Hart, Site QC Supervisor

General Electric Nuclear Energy Business Operation (GENEBO)

C. Brinson, Site QA Engineer
J. Cockroft, Site Engineer

J. Rich Steers (JRS)

J. Gagliano, Resident Engineer
T. Hughes, Site Project Superintendent
M. Russell, Site QC Supervisor

2. Site Tour

Routine inspections were made to observe the status of work and construction activities in progress. The inspector noted the presence of and interviewed QC and construction personnel. Inspection personnel were observed performing required inspections and those interviewed were knowledgeable in their work activities. Work items were examined for obvious defects or noncompliance with regulatory requirements or license conditions. Areas inspected included service water pipe trench excavation and backfill, pipe and hanger installation, storage of materials and equipment, housekeeping, structural steel erection, and HVAC duct and support installation.

3. Safety Related Structures (Structural Steel and Supports) - Observation of Work and Work Activities (Installation of Expansion Anchor Bolts)

During inspection of installed expansion anchor bolts (EAB's) used to fasten pipe and electrical base plate supports to walls and floors, the inspector observed an irregularity in the application of minimum edge distance. Minimum edge distance is discussed and defined in the following documents:

-- Bechtel Specification C-136(Q), Installation of Expansion Type Anchors

-- Bechtel Specific Work Plan/Procedure SWP/P-C-4, Installation of Expansion Type Concrete Anchors

These documents define minimum edge distance as the distance from the centerline of the hole drilled for the EAB to the nearest edge. Based on discussions with Bechtel QC and engineering personnel, the inspector determined that an edge was considered the end of a wall, floor, or a blockout in a wall or floor. Both documents also state the required minimum edge distance in inches for different size EAB's.

The irregularity in the application of minimum edge distance arises from the definition of what is an edge. The inspector agreed with the definition given above but felt it should include embedments such as plate, channel, and strut. If embedded plate, channel, and strut were considered edges, then many as-built examples of EAB's not meeting minimum edge distance requirements as stated in the above two documents would exist.

The inspector, licensee, and Bechtel engineering personnel discussed this issue and concluded that embedded items did not constitute an edge similar to that marked by a concrete boundary. It was agreed, however, that embedded items did constitute an edge and, if located within the boundaries of the EAB pullout cone, were a discontinuity that could affect the strength of the EAB installation.

The interrelationship between EAB's, embedded items, and pullout strength as related to minimum edge distance is unresolved pending an engineering review to assess the affect of embedments on pullout strength and establishment of EAB/embedment edge distance requirements if appropriate. (354/82-09-01)

4. Safety Related Structures (Welding) - Observation of Work and Work Activities

The inspector observed in process work activities involved in erection of concrete panel walls. One of the activities involved automatic stud welding of headed studs to various load carrying structures. These studs act to transfer loading on the panel walls to the building structure. An inspection of the completed welding indicated a problem in that many studs welded to vertical load carrying members did not have a full 360° weld. The welds were incomplete for approximately 45° and the incomplete portion was located at the top.

In the area where this activity was taking place (diesel generator building elevation 155'), the inspector noted that many automatically welded studs had been reworked by manual SMAW at the top of the weld to complete the weld. AWS D1.1 Structural Welding Code and Bechtel Specification C-130(Q) (the code and specification controlling this welding activity) specifically permit manual SMAW to complete a stud weld should it be necessary. The inspector also observed that many automatically welded studs that did not have a full 360° weld were bent and not reworked.

The inspector reviewed AWS D1.1 and Specification C-130(Q) and met with Bechtel welding and QC personnel to determine why some studs were reworked by welding and others were bent without rework. It was determined that for studs other than shear connectors (the classification of the subject studs), neither AWS D1.1 nor C-130(Q) address what must be done if the automatic stud weld is not complete. What Bechtel had been doing was reworking an incomplete weld by manual SMAW. However, because so many incomplete welds

were resulting from an apparent welding process problem, Bechtel decided to bend test the studs to determine their acceptability. This is permitted by AWS D1.1 and C-130(Q) for shear connector type studs.

Because both AWS D1.1 and C-130(Q) state that when a stud weld is not complete, it may be reworked by manual SMAW, and Bechtel had been reworking studs that fell into this category, the inspector felt a precedence had been set that rework of the studs was necessary. However, because the requirements for shear connector type studs are more rigorous than for other than shear connectors, and AWS D1.1 and C-130(Q) permit bend testing of shear connector studs with incomplete welds to determine their acceptability, it appears that the change Bechtel made was not without merit.

The source of this problem was recognized as a welding process problem. Bechtel welding engineering committed to investigating the process problem. The acceptability of bend testing studs other than shear connectors to determine their acceptability for use is an unresolved item pending review of this practice by Bechtel project engineering and, if determined to be acceptable, documentation of the acceptability of this test method. (354/82-09-02)

5. Licensee Action on Previous Inspection Findings

(Open) Unresolved Item (354/82-04-02): Questionable HVAC installation and QC practices by W-H. This unresolved item raised two questions:

(1) Was lack of full thread engagement of bolts into nuts acceptable?

(2) Why was not QC involved in torquing of the ductwork support bolting?

During this inspection report period, the question of lack of full thread engagement was addressed. In particular, Bechtel NCR #1681 identified the problem and presented test data that substantiated closing the NCR with a use-as-is disposition. The inspector reviewed the NCR which described the test setup, combinations of hardware tested, and the varying amounts of lack of full thread engagement used which ranged from 1/16" to 5/16". The conclusion drawn from review of the data was that for up to

at least 5/16" of lack of full thread engagement, the failure mechanism is not related to the nut and bolt but to yielding of the lips of the steel strut into which the bolted connections are made. The inspector had no further questions and considers the first question of this unresolved item closed.

6. Review of Nonroutine Event Reported by the Licensee

On May 14, 1982, the licensee reported a potential significant construction deficiency in accordance with the requirements of 10 CFR 50.55(e) involving the torquing of nuts on studs used to connect the Beloit Power Systems (BPS) generator spider to the Colt generator shaft on the one onsite diesel generator unit. By letter dated August 13, 1982, the licensee withdrew this as a reportable item based on torque verification checks performed onsite.

The problem originated with misapplication by BPS of equipment used for torquing. The misapplication was subsequently identified by Colt Industries during a recheck of the generator rotor to spider fastener torque values during testing of newly designed torquing equipment. Because this problem was identified on the second diesel generator unit for Hope Creek, it placed in doubt the torque values on the one unit previously shipped to the site. As a result, representatives from BPS came to the site and checked the torque values of the affected nuts/studs. A portion of this testing was witnessed by the NRC inspector and all of it was witnessed by site quality personnel. The test results indicated that all studs/nuts had been correctly torqued at the factory prior to shipment to within the acceptable range of 3500-4500 foot-pounds. Additionally, the torquing of the affected bolts on the third and fourth diesel generators was witnessed at the manufacturer's facility by a Bechtel Supplier Quality Representative.

Because the torque value of the subject bolting on all four diesel generators has been checked and the one onsite found to be acceptable, the inspector agrees with the licensee that this item is not reportable and considers the item closed. (354/82-00-02)

7. Review of Implementation of Field Change Notice (FCN) Program

The inspector reviewed the procedures that establish and control the FCN program and then reviewed several FCN's from each discipline to ensure the program was being implemented as designed. The controlling documents are as follows:

-- Bechtel Specification G-014(Q), Rev. 3, General Project Requirements for Allowable Scope for Field Change Notices

-- Bechtel General Work Plan/Procedure WP/P-5, Rev. 2, Field Change Request/Field Change Notice

These procedures limit the use of a FCN to specifically defined situations which have previous project engineering approval. These situations are defined in the G-014 specification and give field engineering latitude to resolve some of the more common construction problems without the time delay incurred when project engineering approval is required as with a Field Change Request (FCR). FCN's are issued by field engineering and are subsequently reviewed by project engineering. The major difference between a FCN and FCR is that with a FCN work may proceed with field engineering's approval whereas a FCR requires project engineering approval before work may proceed.

The G-014 specification, besides listing pre-engineered acceptable changes for each discipline, states that certain FCN's require prior coordination with project engineering as specifically stated in G-014. For these types of FCN's, G-014 requires that the coordination between field engineering and project engineering be documented or referenced on the FCN form by name and date.

The inspector reviewed sixty-five FCN's divided among all disciplines (civil, architectural, mechanical, instrumentation, electrical, HVAC, and piping). The review involved comparing the subject matter of each FCN with G-014 to ensure the subject was included in G-014. If the FCN subject was not specifically listed in G-014, then a determination was made if the FCN should have been a FCR or if it was the type of FCN that could be approved with prior project engineering coordination.

The results of this review indicated that for the most part each discipline was correctly implementing the FCN system. It was noted, however, that several FCN's of the type that required prior project engineering coordination, did not document this coordination. In discussions with licensee and Bechtel personnel regarding this issue, it was not clear if the FCN's had not been coordinated or if the coordination had not been documented. In any case, the particular FCN's involved were not of major significance and Bechtel agreed that all future coordination would be documented on appropriate FCN's.

No items of noncompliance were identified.

8. Safety Related Structures (Structural Steel and Supports) - Observation of Work and Work Activities (Installation of Lateral Trusses)

The inspector reviewed in process work activities regarding modification to and installation of the biological shield lateral trusses. These activities were also discussed in NRC Inspection Report 354/82-08. The modification work to the lateral trusses supplied by PX Engineering was specified by FCR's to Bechtel drawing C-0990-0, Rev. 12. FCR's C-7301, C-5591, C-7674, C-7775, C-5187, and C-7473 detailed rework required to the lateral trusses and gave engineering approval for deviations from design conditions.

The inspector, in the company of Bechtel QC inspectors, made measurements of key dimensions and compared them with drawing requirements. Of the four lateral trusses measured, all were found to be within tolerances specified on the FCR's with the exception of one measurement on truss 2B. The inspector questioned the Bechtel QC inspectors about this discrepancy. The QC inspectors pointed out that they had previously identified this discrepancy and had obtained project engineering approval to accept the measurement as-is. The QC inspectors showed the inspector their punchlist which identified the discrepant measurement and documented the discussion with project engineering accepting the measurement.

No items of noncompliance were identified.

9. Reactor Pressure Vessel Internals - Observation of Work and Work Activities

A. Welding of CRDM housings to RPV stub tubes and in process and final NDE of these welds continued during this inspection report period. The inspector observed welding and NDE activities and reviewed the in process and final inspection records. The NDE required on each of the CRDM housing to stub tube welds is a PT and visual of the root weld, a PT and visual of the weld in the flush condition, a PT and visual of the final fillet weld, and a UT of the total weld. The inspector reviewed the records on a sample basis for the forty-six completed welds. All records were found in order except PT and visual examination reports for eight root welds did not exist. The inspector questioned GEI&SE QC personnel on this matter. They stated that the inspector who had performed the examinations had quit the job without filling out the examination reports. They produced the Joint Process Control Sheet (JPCS) for each of the eight welds which documented that the inspection had been performed. They stated that they had contacted the inspector who performed the examinations and that he had agreed to fill out the PT and visual examination reports. The inspector had no further questions.

B. The inspector learned that GENEBO had issued Field Disposition Instruction (FDI) No. 60/79450 to install additional supports for the core spray headers. This FDI requires that new supports be welded to the inside of the reactor pressure vessel on the weld metal overlay cladding. A review of the FDI and procedures referenced in the FDI resulted in the inspector having the following questions:

1. Does the welding operation have any metallurgical significance on the existing cladding or RPV material?

2. Does welding to an already hydrostatically tested and Code stamped vessel have any significance as to a possible retest?

3. Will the procedure used to determine cladding thickness yield meaningful results?

4. Why are the dates of the Codes referenced as governing the requirements of this work not consistent with either the Codes used to manufacture the RPV or the Codes committed to in the PSAR?

At the end of this inspection report period, answers to these questions were being pursued jointly by the licensee, GENEBO, and the NRC. Answers to these questions are considered an inspector followup item. (354/82-09-03)

10. Safety Related Structures (Welding) - Observation of Work and Work Activities

JRS, the subcontractor erecting the service water intake structure (SWIS), recently established a weld metal control procedure and issue station. These steps were taken because JRS is at the point in construction of the SWIS where safety related welding is required. The inspector reviewed portions of the procedure and discussed the operation of the issue station in detail with the rod room clerk and the QC inspector. The inspector also verified that:

-- Rod warming ovens were functional and that thermometers used to indicate oven temperature were calibrated,

-- Filler metal issue slips were correctly filled out,

-- Access to the rod room was controlled,

-- Safety related and non-safety related filler metal were segregated and identified,

-- Safety related rod had passed through receiving inspection, and

-- Rod was issued to qualified welders only.

No items of noncompliance were identified.

11. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or items of noncompliance. Unresolved items identified during this inspection are discussed in paragraphs 3 and 4.

12. Exit Interview

The inspector met with licensee and contractor personnel at periodic intervals during this inspection report period. At these times, the inspector summarized the scope and findings of his inspection activities.