U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-354/83-08

Docket No. 50-354

License No. CPPR-120 Priority -- Category A

Licensee: Public Service Electric and Gas Company
80 Park Plaza
Newark, New Jersey 07101

Facility Name: Hope Creek Generating Station, Unit 1

Inspection At: Hancock's Bridge, New Jersey

Inspection Conducted: April 18 - June 5, 1983

Inspectors: W. H. Bateman 6/10/83
W. H. Bateman, Senior Resident Inspector date

date

date

Approved by: E. C. McCabe 6/17/83
E. C. McCabe, Chief, Project Section 1E date

Inspection Summary:

Unit 1 Inspection of April 18 - June 5, 1983 (Report No. 50-354/83-08):

Areas Inspected: Routine unannounced safety inspection by the resident inspector (129 hours) of work in progress including structural steel bolting and welding, HVAC ductwork and support installation, cable tray and conduit installation, reactor pressure vessel cleanliness, service water pipe trench backfill activities, housekeeping, storage of equipment and materials, traceability of electrical cable, pipe, valve, and pipe support installation and records review, and concrete preplacement, placement, and post-placement activities. The inspector also made tours of the site, inspected in process work activities at the offsite fabrication shop, participated in an inspection of onsite radiography practices, evaluated licensee action on previous inspection findings, and discussed and observed action taken by the licensee to resolve construction deficiency reports.

Region I Form 12
(Rev. February 1982)

Results: Violations: One (failure of PDM quality control inspection to identify pipe support welding and installation discrepancies as described in paragraph 3).
Deviations: One (valves supplied by General Electric designed and manufactured to a code different than that committed to in the PSAR as described in paragraph 4).

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, Manager, QA Engineering and Construction
R. Griffith, Principal Staff QA Engineer
P. Kudless, Project Construction Manager

Bechtel Power Corporation (Bechtel)

A. Albrechtson, Lead Piping Engineer
A. J. Bryan, Project QC Engineer
P. Cary, Resident Engineer, Electrical
G. Cavallo, Resident Engineer, Civil
W. Dorman, Assistant Project Field Engineer
M. Drucker, Lead Site QA Engineer
W. Flear, Assistant Project Field Engineer
J. Gohde, Project Superintendent, Contract Administration
R. Hanselman, Lead Welding Engineer
M. Henry, Project Field Engineer
D. Long, Project Superintendent
R. Mackey, Resident Project Engineer
G. Moulton, Project QA Engineer
J. Pfeiffer, Assistant Project Construction QC Engineer
D. Sakers, Assistant Project Civil QC Engineer
J. Serafin, Assistant Project Field Engineer
R. G. Tringale, Assistant Project Field Engineer
C. Turnbow, Field Construction Manager
S. Vezendy, Lead Welding QC Engineer

General Electric Apparatus and Engineering Service Organization (GEA&ESO)

R. Burke, Site Project Manager

General Electric Nuclear Energy Business Operations (GENEBO)

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

J. Rich Steers (JRS)

J. Gagliano, Project Engineer
T. Hughes, Site Project Superintendent
E. Lingo, Project QA Manager

Pittsburgh - Des Moines Steel Corporation (PDM)

D. Passaro, Site QC Supervisor
D. O'Conner, Site Engineer

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 cable tray and conduit installation, concrete curing, housekeeping, storage of materials and equipment, welding, fire protection measures, and HVAC ductwork and support installation.

The specific activities inspected were controlled by approved procedures and performed in accordance with these procedures. No items of noncompliance were identified.

3. Safety Related Pipe Support and Restraint Systems

The inspector reviewed in process and completed work and QC inspection records by PDM pertaining to modification work on sixteen torus spray header supports. The modification work was detailed in PDM Supplement Group FC1 for Spray Header Supports and on PDM drawing E34A. Inspection of five modified supports resulted in the inspector identifying the following discrepancies:

-- Undersize fillet welds on the supports attached to stiffener numbers 17, 24, and 32.

-- Weld undercut in excess of 1/32" on the supports attached to stiffener numbers 24, 25, and 32.

-- Support arm slope not in accordance with drawing requirements for supports attached to stiffener numbers 24 and 32.

-- Clearance between pipe and upper support member not in accordance with drawing requirements for support attached to stiffener number 30.

-- Grinding wheel nicks (2) on torus header pipe near support attached to stiffener number 17.

Note: This list of discrepancies resulted from a partial inspection of each support.

The inspector reviewed the following QC records to determine if QC inspection activities had identified the above listed discrepancies:

-- Fabrication Checklists (FCL's) #'s 342-357 for stiffener numbers 17-32.

This review disclosed that:

-- PDM QC final inspected and accepted welds with deficiencies as noted above.

-- The FCL's did not contain an inspection point to verify that support arm slope was per drawing requirement.

-- The FCL's did not contain an inspection point to verify that the required clearance between the pipe and supports was achieved.

-- The grind wheel nicks had been identified and dispositioned per ECAR F153.

The inspector reviewed the requirements of PDM visual inspection procedure, CVT-01, Visual Inspection for ASME III, Division 1, Subsection NC, ND, NE, and NF, Rev. C, used to perform the required welding inspections. Paragraph 6.0 lists the acceptance standards. Paragraph 6.3 states:

> Welds shall be free from undercut as defined: Undercut shall not exceed 1/32 inch and shall not encroach on the section thickness.

Paragraph 6.4 states:

> Fillet welds shall be of a specified size with full throat and legs as required.

The failure of PDM QC inspection activities to identify weld deficiencies and installation discrepancies indicates inadequacies in the PDM quality program, is contrary to Criterion X of Appendix B of 10 CFR 50, and is a violation. (354/83-08-01) Prior to the end of this inspection report period, corrective action was taken to close this violation. The corrective action consisted of reworking the weld and hanger clearance discrepancies to meet procedure and drawing requirements. The inspector inspected the rework and found it to be satisfactory. Review of the inspection records disclosed that the unsatisfactory inspection had been performed by a single inspector who is no longer assigned to the Hope Creek Project. Based on satisfactory corrective action, the inspector considers this item closed.

During review of the base metal repair procedure for the two grinding wheel knicks, the inspector noted inaccuracies in the requirements for RT of base metal repairs. In PDM Repair Procedure RP-02, Repair of Carbon and Stainless Steel Base Metal Defects, ASME Section III, Division I, Subsections NC, ND, NE, and NF, Rev. I, it was stated that RT of base metal repairs was required when the depth of the defect exceeded 1/8" for material equal to or less than 3/8" thickness. This requirement was not consistent with ASME III Subsection NC requirements which state RT of base metal repairs is required when the repair cavity exceeds the lesser of 3/8" or 10% of the section thickness. Based on the section thickness of the torus spray header pipe and the depth of the grind marks, it was necessary to RT the weld repairs, although RP-02 did not require RT. Because the inspector noted this discrepancy prior to the weld repairs, Revision K of RP-02 was issued to correct the inconsistency with the ASME Codes prior to making the weld repairs. The inspector questioned why the discrepancy had not been identified during review and approval of RP-02 by both PDM and Bechtel. The inspector was informed that the only explanation was that the discrepancy was inadvertently missed. The inspector requested that a review be conducted to determine whether or not RP-02 had been improperly used on previous occasions. A review was conducted and it was determined that there were no previous improper uses of this procedure. The inspector had no further questions.

An installation discrepancy identified earlier in this paragraph involved the torus spray header support arm slope. PDM personnel stated that as-built drawings identified these discrepancies and the actual slope had been factored into the stress analysis. The inspector requested to review this as-built data but it was not made available for review prior to the end of this report period. The as-built slope of the brace arm supports versus the slope required by fabrication drawings is an unresolved item pending the inspector's review of the as-built data. (354/83-08-02)

4. Safety Related Components - Review of Records and Observation of Work and Work Activities

As a result of an installation and records review of the pressure relief valves (PRV's) on the Service Water side of the RHR heat exchanger, the inspector noted the following apparent discrepancies:

(1) The PRV's were mounted in a horizontal plane which is contrary to manufacturer's recommendations.

(2) The Bechtel installation drawing indicated the PRV's were attached to the heat exchanger and, therefore, did not have to be installed in the field which was not the case.

(3) The PRV's were designed and manufactured to ASME Section VIII in lieu of ASME Nuclear Pump and Valve Code (NP&VC) as committed to in the PSAR. This specific change is not a safety concern.

(4) Threaded connections on PRV PS-V-2513A were not completely seal welded in apparent violation of Code requirements.

The specific PRV's involved were manufactured by the Kunkle Valve Company and supplied by GENEBO as part of the NSSS. They are Kunkle Figure No. 700 spring loaded safety valves with a set pressure of 450 psig and a capacity of 63 GPM liquid or 2805 lbs/hr steam. Their tag numbers are PS-V-2513A and 2513B.

The discrepancies noted in paragraphs (1) and (4) above require justification for deviating from manufacturer's recommendations and Code requirements. It should be noted that later editions of the ASME III Code and Non-Mandatory Appendix M to ASME VIII also recommend that spring loaded safety valves be installed in the upright position. The mounting of the PRV's in a horizontal plane and incomplete seal welding of the threaded connections on the PRV's is an unresolved item pending licensee justification for deviating from manufacturer's recommendations and Code requirements. (354/83-08-03).

The discrepancy noted in paragraph (2) above resulted from a Bechtel drafting error. The small bore pipe drawing (1-P-EG-230, Rev. 5) should have indicated that the PRV's were supplied by GENEBO but had to be installed by Bechtel. Because the drafting error indicated the valves were installed as part of the RHR heat exchanger, QC was never involved in the installation activities of the valves. Because of this discrepancy, Bechtel QA investigated similar interfaces with vendor supplied equipment and found similar problems. As a result, Bechtel is following up all

drawings that depict interfaces with vendor supplied equipment and small bore pipe and revising them as appropriate to ensure QC involvement in installation activities. The Bechtel drafting error on small bore pipe drawings is an unresolved item pending completion of drawing review of all vendor equipment/small bore pipe interfaces, correction of drafting errors found, and followup to ensure QC inspection of any items installed without QC inspection.

Paragraph (3) above may indicate a larger problem. PSAR Tables 15.4-1 and 15.4-2 specify that the service water (secondary) side of the RHR heat exchanger is Quality Group C and that all pumps and valves should be designed and fabricated to the ASME Nuclear Pump and Valve Code, Class III. But, the two PRV's on the RHR heat exchanger secondary are designed and fabricated to ASME VIII. This is a Deviation (354/83-08-05) from the PSAR commitment. Although ASME VIII compliance is suitable for this specific application, deviating from commitments made to the NRC is not acceptable practice and absence of control over such commitments could result in safety significant deviations. Therefore, the licensee was asked to address all potential PSAR Code commitment deviations in piping, pumps, valves, heat exchangers, and pressure vessels of all Quality Groups.

5. Licensee Action on Previous Inspection Findings

(Closed) Noncompliance (354/82-12-02): Failure to implement weld rod issue procedures. SWP/P-19 was revised to require that Field Welding Engineering verify a QCIR exists for the joint to be welded prior to welding. The inspector questioned several Field Welding Engineers as to how they accomplish this verification and was informed that they contact QC. The inspector reviewed recent NCR's and determined no additional problems with weld rod issue control have been identified. The inspector also observed welding activities in progress and determined weld rod was properly issued. The base metal repair was nondestructively examined in accordance with ASME III Code requirements and the craft personnel involved were instructed on weld rod issue procedures. The inspector considers the corrective action complete and this item closed.

(Closed) Noncompliance (354/83-02-01): Failure of JRS to properly cure concrete. Upon identification of this violation, JRS covered the affected surfaces with moist burlap and extended the curing period four additional days. Additionally, JRS personnel were instructed as to the correct interpretation of curing during cold weather concreting. The inspector had no further questions and considers this item closed.

(Open) Part 21 (354/81-SB-01): Incorrect MT of piping spools by Dravo. The inspector reviewed corrective action taken by the licensee to address the failure of a Dravo inspector to correctly MT welds. The corrective action involved correctly reperforming MT of a sample of the joints that were incorrectly examined by the Dravo inspector. The results of this reinspection were that no rejectable indications were identified. Based on these results, the licensee closed the issue. The inspector considers this corrective action incomplete based on the consideration that the ASME III Code required the joints be inspected by MT. Because the joints were not correctly examined (prods used in one direction only), no credit should be taken for examination of any joints not correctly re-examined. The inspector considers the sample re-examination an inadequate basis to conclude all welds not properly examined meet ASME III requirements. This item remains open pending correct MT examination of all welds incorrectly examined by the Dravo inspector.

(Closed) Inspector Follow Item (354/81-15-02): Overpressure test of flued head containment penetration welds. Bechtel applied for an ASME Code Case to resolve this issue. The ASME Code Case N-362 was approved. The particulars follow:

> It is the opinion of the Committee that, for Section III, Division I, Class 1, 2 and MC construction, the following rules may be used as an alternative to the system test pressure specified in NB-6221 and NC-6221 for Class 1 and Class 2 items, such as flued heads and expansion bellows which become part of the containment system:
>
> 1. The items and connecting weld shall be pressure tested at the containment Design Pressure.
>
> 2. All other requirements of Section III, Division 1, for the applicable Class of construction shall be met.
>
> 3. This case is applicable only to the portion of an item which performs a containment system function.
>
> 4. The Case number shall be identified in the Data Report.

The licensee informed the inspector that this Code Case would be made part of the license application by amendment of the FSAR The inspector had no further questions and considers this item closed.

(Open) Unresolved Item (354/82-08-01): Inconsistency in Codes used to design, fabricate, and install steel used to support ASME III pipe. The licensee presented a comparision between the two specifications used to purchase the steel. This comparison was made to demonstrate that the steels were equivalent in their design, fabrication and installation. The inspector forwarded this information to NRC Licensing for review. This item will remain open pending the outcome of the Licensing review.

6. Electrical Cables - Record Review for Traceability •

The inspector verified that information stamped on routed cable can be used to retrieve the required documentation package containing cable certification and test data required by the appropriate specification, IEEE standards, and the PSAR for that cable. The following two cables were used to verify traceability:

-- Cable No. CC1Q0895A Tag No. A04 Footage No. 3202890

-- Cable No. CP1Q0721C Tag No. C19 Footage No. 3238800

The traceability system was determined to work as follows:

(1) The tag number stamped on the cable at frequent intervals is used in conjuction with Bechtel Drawing E1000 (latest revision) to obtain the Material Receiving Record (MRR) Number.

(2) Cable certification and test data are filed in the records vault by MRR No. Because many reels of cable are covered by each MRR No., the footage number stamped on the cable is required to get to the specific data.

(3) A review of each file containing the applicable MRR No. is required until that file containing the reel with the applicable footage number is identified.

(4) The reel versus footage information is contained on the cable manufacturer's Inspection Sheet for Wire and Cables. This sheet also specifies the manufacturer's order number.

(5) The manufacturer's order number is then used to retrieve the applicable Certified Test Report, Physical Test Reports, Certificate of Conformance and Quality Assurance Traceability Schematic.

Although a somewhat detailed review of MRR packages may be required to isolate the specific reel, the system functions effectively. Because this system functions, it is not necessary for QC to inspect cable cutting activities to ensure traceability.

The inspector determined the traceability system to be well thought out and effective. No concerns were identified.

7. Offsite Fabrication Shop - Observation of Work and Work Activities

The Offsite Fabrication Shop is located in Paulsboro, N. J., approximately 35 miles from the jobsite. At the time of the inspector's visit, approximately 64 people were employed at the shop and safety related work activities included fabrication of:

-- Small bore pipe spools

-- Large bore pipe spools

-- Pipe hangers

-- Pipe whip restraints

-- Embeds of various types

-- Specialty work involving modications to vendor supplied items, e.g., modification of bioshield door hinges.

The purpose of the inspector's visit was to observe work in progress, determine the effectiveness of shop supervision and QC, and ensure procedures governing safety related work activities were being effectively implemented.

The inspector specifically observed welding on small and large bore pipe spools, pipe hangers, pipe whip restraints, and embeds and liquid penetrant examination of socket welds on small bore pipe spools. The pipe and hanger welding was being performed to ASME III requirements and other welding to AWS D1.1 requirements. The inspector reviewed the weld rod control procedures and their implementation, conformance of weld joint geometry to procedure requirements, welders' qualifications, and quality of completed welds. The inspector ensured liquid penetrant testing was being properly performed by qualified personnel. All was found satisfactory.

The inspector reviewed in process and completed QCIR's, NCR's, controlled drawings, and weld rod issue slips. All the documentation reviewed was found to be in accordance with controlling procedures. The inspector also verified that all calibrated instruments in use were included in the site calibration program and were calibrated.

The inspector interviewed the Shop Superintendent, Lead Welding Engineer, Lead Field Engineer, and Lead QC Inspector to determine their knowledge of quality requirements as related to safety related work in progress. All interviewed were found to be quality conscious and capable.

In conclusion work activities in progress at the shop were found to be in accordance with controlling procedures. Management of shop activities was being performed by capable people who have been continuously employed in their present positions for at least three years. Inspection of in process and completed work indicated a high quality of supervision and QC inspection. No violations were identified.

8. Design of HVAC Ductwork and Supports Inside the Drywell

During a review of drywell HVAC ductwork and ductwork support design and inspection criteria, the inspector noted that none of the ductwork was considered safety related. However, to address Seismic II/I concerns, the ductwork supports were designed Qs which means the supports come under a portion of the project quality program. Further review by the inspector indicated that attachment of the ductwork to the supports was not considered Qs. The inspector questioned the logic of designing the supports Qs and not the attachment of the ductwork to the supports as the ductwork itself is the Seismic II/I item of concern.

In response to this concern, Bechtel stated that a substantial factor of safety is incorporated into the design of the attachment between the ductwork and its support(s). The high factor of safety, combined with Field Engineering inspection requirements normal for non-safety related activities, was presented as justification for not classifying ductwork to support attachment welding and bolting as Qs. Because Bechtel Project Engineering had evaluated this question and decided on a course of action prior to the inspector's question, the inspector considered that Seismic II/I design considerations were thorough. The inspector had no further questions.

9. Structural Concrete - Observation of Work and Work Activities and Records Review

The inspector observed preplacement, placement and post-placement activities associated with the first cylindrical reactor building dome placement. This placement was identified as 1-BX-W009. The details of the geometry of this placement are presented on Bechtel drawing C-0738, Rev. 1. This drawing required that rebar be covered with $2\pm\frac{1}{2}$" of concrete. The inspector's measurements between the formwork and rebar at the spring-line prior to the placement indicated certain areas where this requirement could not be met. The

inspector questioned Field Engineering personnel on this discrepancy and determined that Field Engineering was aware of the problem. At the time of the placement, the inspector verified a FCR had been written to address the rebar cover question. The inspector observed that the formwork was clean and the construction joint properly prepared prior to the placement. An unexpected rain storm occurred approximately two hours after the placement commenced. This resulted in an inadvertent addition of water into the surface of the freshly placed concrete in some areas. The inspector questioned QC personnel as to their plan of action to prevent this water from affecting the water/cement ratio of the freshly placed concrete. QC personnel stated that vibration of concrete where water was present on the surface would not be permitted and vacuum cleaners were in use to remove the surface water. The inspector observed the efforts made to solve the water removal problem.

The construction joint was cured by use of a curing compound. The inspector observed that the construction joint was completely covered with curing compound. The inspector felt, based on his observations and discussions with Project Engineering and QC personnel, that the placement was performed satisfactorily.

The inspector inspected wall number 191 from elevation 102'-0" to 130'-0" for visable defects after removal of formwork. This wall is located between the drywell shield wall and the reactor building cylindrical wall on the northeast side. A major defect involving exposed rebar was noted at the top of the wall on the north face. The inspector reviewed QCIR 1-BG-W511-C-1.40 to determine if Bechtel QC post-placement inspection had identified this defect. This review disclosed that QC had performed only a partial post-placement inspection, had not identified this defect, and had not signed off the QCIR. The inspector then questioned Field Engineering personnel to determine if their post-placement inspection had identified this defect and if they had initiated a Concrete Defect Report in accordance with their procedures. The inspector determined that Field Engineering personnel had identified the defect and were in the process of writing a Concrete Defect Report. The inspector's review in this area confirmed that both QC and Field Engineering personnel were performing in accordance with the controlling procedures. No violations were identified.

10. Reactor Pressure Vessel Internals Installation - Observation of Work and Work Activities

GEA&ESO completed Phase I of the installation of reactor vessel internals during this inspection report period. Phase II installation is scheduled to commence in 1985. The inspector was involved in a final cleanliness

inspection of the vessel just prior to its closure and commencement of in place storage procedures. The inspector's observations of the vessel cleanliness determined that GENEBO cleanliness requirements were met prior to vessel closure. No inspector concerns were identified.

11. Unresolved Items

Unresolved items are matters about which more information is required to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during the 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.