

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 50-354/84-05 Docket 50-354 License CPPR-120

Licensee: Public Service Electric and Gas Company

Facility: Hope Creek Generating Station

Inspection At: Hancock's Bridge, New Jersey

Conducted: May 14 - June 24, 1984

Inspector: W. H. Bateman  
W. H. Bateman, Senior Resident Inspector

7/3/84  
Date

Approved: E. C. McCabe  
E. C. McCabe, Chief, Project Section 1C

7/23/84  
Date

Summary:

May 14-June 24, 1984 (Report No. 50-354/84-05): Routine resident safety inspection (144 hours) of work in progress including torus modification, raceway and cable installation, seismic II/I program, HVAC ductwork supports, instrumentation, house-keeping, NCR and SDR trending, hydrostatic testing, electrical terminations, and pipe and hanger installation. The inspector also made tours of the site, reviewed licensee action on previous inspection findings, commenced a review of the licensee's Startup and Test Program Manual, and evaluated licensee response to Construction

Deficiency Reports. Violations were identified for improper tie-wrapping of safety-related cable (Details 3a, 3b), for unauthorized modification of the torquing of the anchor bolts for a conduit support (Detail 3C), and for improper installation of Control Room Console shims (Detail 4).

## DETAILS

### 1. Persons Contacted

#### Public Service Electric and Gas Company (PSE&G)

A. Barnabei, Principal QA Engineer  
J. Ciccone, Manager Startup and Test  
N. Dyck, Senior Staff Engineer  
W. Gailey, Chief Project Engineer  
A. E. Giardino, Manager, QA Engineering and Construction  
R. Griffith, Principal Staff QA Engineer  
P. Landrieu, Project Manager  
M. Metcalf, Principal Startup QA Engineer  
G. Owen, Principal Construction Engineer  
A. C. Smith, Project Construction Manager

#### Bechtel Power Corporation (Bechtel)

A. Albrechtson, Lead Piping Engineer  
A. J. Bryan, Project QC Engineer  
W. Cole, Lead Site QA Engineer  
M. Curley, Lead HVAC QC Engineer  
W. Dorman, Assistant Project Field Engineer  
S. Evans, Lead Electrical QC Engineer  
J. Gohde, Project Superintendent, Contract Administration  
N. Griffin, Project Field Engineer  
A. Landi, Lead Pipe Support QC Engineer  
D. Long, Field Construction Manager  
R. Mackey, Assistant Resident Project Engineer  
B. Markowicz, Project Manger  
G. Moulton, Project QA Engineer  
B. Mukherjee, Resident Project Engineer  
J. Pfeiffer, Assistant Project QC Engineer  
D. Sakers, Assistant Project QC Engineer  
J. Serafin, Assistant Project Field Engineer  
F. Thesing, Contracts Administration  
C. Turnbow, Manager of Construction  
S. Vezendy, Assistant Project QC Engineer  
N. Wypch, Lead Piping QC Engineer

#### General Electric Nuclear Energy Business Operations (GENEBO)

J. Cockroft, Site Engineer  
R. McKenna, Chief 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 housekeeping, storage of materials and equipment, weld rod control, cable pulling, pipe and hanger installation, electrical terminations, and HVAC ductwork supports. No unacceptable conditions were identified.

## 3. Electrical Raceway and Cable Installation

The inspector observed completed raceway and cable installations in the reactor building to ensure conformance to controlling procedures. These observations resulted in identification of the following three deficiencies which comprise a single violation:

- (a) Tie-wrap spacing for cable routed in vertical trays 12ATMD90 and 14BTMQ92 exceeded the 5 foot limit specified in paragraph 1.18 of Bechtel Drawing E-1408-0. The failure to tie wrap cables to tray rungs at proper intervals in accordance with installation procedures is contrary to Criterion V of Appendix B of 10 CFR 50. (354/84-05-01)
- (b) Cables routed in trays 12ATMD90, 12BTMD90, and 12BTMB49 were not tie-wrapped to rungs of the tray as required by paragraph 1.14.2.b of DCN 29 to Bechtel Drawing E-1408-0. The cables were tie-wrapped to other cables already in the tray. The failure to tie-wrap cables to tray rungs in accordance with installation procedures is contrary to Criterion V of Appendix B of 10 CFR 50. (354/84-05-02)
- (c) Conduit support C-046 (Type R-1C) at elevation 129' shown on Bechtel Drawing FSK R-2604 Sheet 3, Rev. 4 and Sheet 4, Rev. 4 had been reworked subsequent to QC inspection as indicated by discontinuities in the fast drying "torque paint" applied by QC to the expansion anchor bolts used to fasten the strut portion of the support to the wall. QC records indicated the support had been QC accepted 12/15/82 and no rework card had been issued. Paragraph 7.3 of Bechtel SWP/P-E-110, Rev. 5, Raceway Hanger Installation, requires issuance of a rework hanger card prior to modification or temporary removal of a QC accepted hanger. The failure to issue a rework hanger card prior to reworking conduit support C-046 on Bechtel FSK R-2604 is contrary to Criterion V of Appendix B of 10 CFR 50. (354/84-05-03)

#### 4. Electrical Components and Systems - Observation of Work and Work Activities

The inspector reviewed the completed shimming and welding activities associated with installation of the Control Room Console. This inspection was performed to closeout NRC unresolved item 83-09-04. The following documents were used as references:

- Bechtel FCR's J-314, J-259
- Bailey Controls Company Drawing E 4841505C
- Bailey Controls Company Control Room Console Seismic Qualification Test Report QR-4501-HC-PAN.

The inspector found that QC had accepted this installation with shims missing under one vertical framing element and undersized fillet welds connecting shims to embedded channel in two locations. This is a violation which reflects failure to perform work as prescribed and failure to execute the QC inspection program so as to verify conformance with the governing documents. (354/84-05-04)

#### 5. Licensee Action on Previous Inspection Findings

(Open) Noncompliance (354/80-02-01): Substantial amounts of foreign matter were contained in SRV piping and QA/QC surveillance systems were not functioning to identify these types of problems. Subsequent to this finding changes were implemented in the Bechtel and PDM contractor QC surveillance programs which have proven to be effective. A question remained regarding the cleanliness of the torus spray header piping as this pipe was installed prior to the changes in the QC surveillance programs and was inaccessible for inspection. It had been planned that this item would remain open until a flush of the line indicated no foreign matter existed in the pipe. During this report period, it was determined that a flush of this system was not feasible. As a result, this item will remain open until a satisfactory design full flow water test of the system is performed.

(Open) Part 21 (354/81-SB-01): Questionable magnetic particle testing (MT) of weld joints contained in piping spool pieces supplied by Dravo. This item was discussed in Inspection Report 81-07 and remained open pending LP reexamination. The LP reexamination indicated no rejectable indications. During a review of the licensee's correspondence files on this issue prior to closing it, the inspector noted two letters, each from a different Bechtel Supplier Quality Representative (SQR), stating that the Dravo inspector involved rarely performed a proper MT. Based on this information, the inspector informed the licensee that this item would remain open until all welds MT examined by the Dravo inspector were identified and reexamined in the field in accordance with ASME III Code requirements. In response to this NRC position, Bechtel obtained a letter from Dravo stating Dravo had interviewed the inspector and

determined the only time the inspector performed an improper MT was the time he was observed so doing and only involved three welds. These three welds were subsequently reexamined and found to be acceptable. In addition, many other welds MT examined by the subject inspector were reexamined at the Dravo shop and found acceptable. Bechtel also questioned the two SQR's as to the source of their information regarding the Dravo inspector. Both of the SQR's stated their concerns were based on hearsay. This item will remain open pending NRC corroboration of the Dravo inspector's statement involving the extent of improper MT.

(Closed) Inspector Follow-up Item (354/82-12-03): Bypass of QC holdpoints and unauthorized reworks: A review of recent NCR trend data indicated that corrective actions taken to stop bypassing of QC holdpoints have been effective. Based on the lack of new NCR's to this trend and the fact that QC would eventually identify all bypassed holdpoints when inspection reports were reviewed for closure, this item is closed. The portion of this item involving unauthorized reworks will be tracked via Inspector Follow-up Item 354/83-14-10.

(Closed) Unresolved Item (354/83-06-01): Discrepancy between manufacturer's and Bechtel's maximum allowable tie-wrap spacing for cable in horizontal and vertical tray runs. Inspection Report 83-09 resolved the horizontal tie-wrap spacing question. During this report period, Bechtel presented calculations performed by Project Engineering that showed 5 foot spacing of vertical tie-wraps does not exceed the 50 pound load recommendation. These calculations were based on actual cable weight.

(Open) Unresolved Item (354/83-08-03): Horizontal mounting and incomplete seal welding of threaded connections of RHR heat exchanger service water side relief valves. It was determined that Delta Southern, the heat exchanger manufacturer, was responsible for horizontally mounting the relief valves and that the heat exchangers were part of the NSSS equipment supplied by GE. GE's position on the horizontal mounting of relief valves was that either way was acceptable to them because the vertical mounting was a manufacturer's recommendation, not a requirement. Bechtel was not involved in the design of the relief valves, but did interface at the discharge side with drain piping. GE obtained a letter from Kunkle dated 12/15/83 (letter number 0257144) that stated Kunkle recommends that relief valves be mounted with the spindle vertical, but that field experience indicates that valves are installed and functioning in a horizontal position. The letter also stated additional installation criteria that should be met if the valves are installed horizontally. The letter concluded by saying that if the valves are mounted in a horizontal position and their installation recommendations are followed, the valves may operate without major problems.

In summary, the heat exchanger manufacturer did not follow the manufacturer's recommendations as to proper mounting of the relief valves. However, the

relief valves as presently installed, meet the intent of Kunkle's additional installation criteria for satisfactory operation in the horizontal position. The inspector considers this portion of the unresolved item closed. The question involving incomplete seal welding of the threaded connections to the relief valves remains open.

(Closed) Unresolved Item (354/83-09-03): Classification of Control Room Console (CRC) as non-safety related. Review of the purchase document and related design drawings indicated the CRC to be safety-related. The only document indicating the CRC to be non-safety related was the Bechtel Equipment Index which has been revised to show the CRC as safety-related. Bechtel issued instructions to all field engineering and supervisory personnel to clarify that design drawings, not the Equipment Index, control the safety status of an item. QC inspection records were initiated to document correct performance of welding and other installation activities.

(Open) Unresolved Item (354/83-09-04): Affects of Control Room Console shimming on seismic analysis. Bechtel informed Bailey Controls Co. of the shimming details. With this information the seismic analysis was reperformed and found to be satisfactory. The inspector reviewed the drawing containing the shimming information and applicable FCR's (see paragraph 4 of this report for specific details) to determine if the as-built condition of the shimmed console was represented by the drawing. This review disclosed the following two discrepancies:

- (1) Shim details were inaccurate on the east side of section 10C651A of the console.
- (2) Welds were not of the type indicated by weld symbols.

This item will remain open pending issuance of drawings that reflect as-built conditions and project engineering evaluation of the discrepancies to determine if they affect the seismic analysis. Other discrepancies with the installation are discussed in paragraph 4 of this report.

(Closed) Unresolved Item (354/83-09-06): Justification for use of friction type clamps to attach electrical raceways to supports. Bechtel's response is as follows:

1. Cable trays were tested by the supplier for static and dynamic loading conditions. The tests were performed with the tray/hold down clamp combination to simulate field conditions (PW Industries Drawing SK-2720). In all cases the trays and the hold down clamps were found to meet or exceed the design loading.

2. In an independent generic testing program (FSAR Section 3.10.3.2) undertaken by Bechtel, the hold down clamps were also qualified. The test revealed that the hold down clamps can resist forces with longitudinal bracings spaced as far as 40-ft approximately. Hope Creek project, however, has conservatively selected the spacing of the longitudinal bracings to be 24 ft-0 in.

Bechtel File No. 10855-E34Q8-1 contains the supplier's test data for static and dynamic loading conditions and Bechtel Test Report No. 10532114 contains the results of the Bechtel hold down clamp qualification tests.

(Closed) Inspector Followup Item (354/83/14-01): Updating of licensee QA manuals and the PSAR to reflect recent QA organizational changes. The affected document and the date it was updated are as follows:

<u>Document</u>	<u>Date Updated</u>
QAP-1, Rev. 3	11/28/83
QAP-2, Rev. 10	11/28/83
PSAR	10/21/83
QAI's	12/30/83

All commitment dates to the NRC were met.

(Closed) Inspector Followup Item (354/83-14-02): Effectiveness of the corporate QA organization. This item was identified as a weakness during the Construction Team Inspection. This concern was triggered by references to a corporate QA program in various licensee QA procedures. These procedures had not undergone revision after the recent QA reorganization to place all construction QA under the Vice-President, Engineering and Construction and all operations QA under the Vice-President for Operations. This reorganization and subsequent procedure revisions deleting the no longer valid references to corporate QA have resolved this issue.

(Closed) Unresolved Item (354/83-14-04): Independence of design verification of work performed by field supports group. Investigation into this item determined that a minimum of four different people review all calculations. Specifically, the originator, checker, reviewer, and final approval by a professional engineer are involved. Additionally, there are specific limits established by Project Engineering within which field engineering must stay. Also, all supports designed onsite are issued via a FCN which ultimately must be approved by Project Engineering.

(Closed) Unresolved Item (354/83-14-05): Perpendicularity limits on installed expansion anchor bolts (EAB's). Bechtel performed tests on EAB's skewed 10° from perpendicular and determined that the loading capability

was not affected. The 10<sup>0</sup> skew limit has been incorporated into specifications C-129 and C-136. QC incorporated the skew limits into the inspection criteria and have fabricated a gauge to measure EAB skew. Bechtel justification for the acceptability of EAB's installed prior to establishment of the 10<sup>0</sup> criteria is based on previously existent criteria that required EAB's be installed in accordance with manufacturer's instructions (5<sup>0</sup>) and the fact that a 10<sup>0</sup> skew would be quite obvious.

(Closed) Inspector Followup Item (354/83-14-07): Lack of Bechtel QC involvement in W-H welder qualifications. Bechtel QC initiated Administrative Directive No. 23 on 11/2/83 which stated QC shall monitor subcontractor welder qualification activities. Specifically, it states QC engineers shall monitor all onsite subcontractors' welder qualification activities to assure QA program and specification compliance. This monitoring activity shall be documented on a QC inspection record.

(Open) Inspector Followup Item (354/83-14-10): Unauthorized reworks. This item was discussed as a weakness in the Construction Team Inspection. Review of the NCR trend data indicates that there is no trend in either direction but that a problem still exists in that a small quantity of NCR's are being generated each month on this issue. The following corrective action has been taken:

- (1) Emphasis made to all Bechtel supervisory personnel regarding the importance of proper rework control.
- (2) Training to inform responsible personnel of rework program requirements.
- (3) Immediate investigation of each incident and a subsequent meeting between the individuals involved and the Bechtel Field Construction Manager.
- (4) Strong disciplinary action will be taken when appropriate for violation of rework control procedures.

This item will remain open for additional followup.

(Closed) Unresolved Item (354/83-16-01): Acceptability of cocked spring nuts in raceway support assemblies. Bechtel performed an analysis of the individual supports involved and determined they were not degraded. It was clearly stated that cocked spring nuts are not acceptable and QC held training sessions to emphasize this inspection attribute. QC performed a reinspection of 1636 bolts and identified two additional discrepancies. The problems identified are considered isolated.



(Open) Unresolved Item (354/83-16-02): Limits on conduit clamp bolt bending. Bechtel performed tests at their laboratory and confirmed that any amount of bending of the conduit clamp bolts is acceptable providing the bolts do not break. This item will remain open pending NRC review of the test results.

(Open) Unresolved Item (354/83-16-03): Gap requirements when using washers with conduit clamps. Bechtel performed tests on conduit clamps and determined that there is no need to specify a minimum gap. The minimum gap requirement will be deleted from the design drawings. It was also stated that the use of washers in conduit clamps has been discontinued. This item will remain open pending NRC review of the revised drawings.

(Closed) Unresolved Item (354/83-16-04): Protection of installed mechanical snubbers. The licensee and Bechtel agreed to delay stroking of snubbers until just prior to room/area turnover to startup. In addition the snubber protection program now in effect will continue and supervision has been instructed to be more sensitive to high traffic areas.

(Closed) Noncompliance (354/83-18-01): Failure to use partial penetration welds on skewed T-joints in pipe support steel. As a result of the QC inspection of the 499 hangers, a total of seven hangers were identified with inadequate depth of weld penetration. Additionally, seven hangers could not be located for evaluation. The seven nonconforming hangers were reworked. The seven hangers that could not be located were assigned new identification numbers and were refabricated to ensure the old hangers would not be used. QC continues to inspect the fitup on 100% of all skewed T-joints to assure the use of partial penetration welds.

#### 6. Review of Test and Startup Program

The inspector commenced a review of the licensee's test and startup program. The basic structure of the program is described in detail in the Startup Administrative Manual which is made up of a collection of Startup Administrative Procedures (SAP's). The inspector reviewed several SAP's for conformance to FSAR commitments and did not identify any discrepancies. The inspector also met with the Startup Manager and discussed his organization, schedule, personnel and their qualifications, handling of nonconformances, turnover activities, and interface control between Startup and Bechtel. The inspector determined that the test and startup program schedule is ambitious.

#### 7. Trending of Nonconformances

The inspector reviewed recent trends identified by Bechtel QA. One of the potential trends involved overpressurization during hydrostatic testing. The inspector met with the personnel involved in the three incidents

and determined that none of the incidents actually involved overpressurizing pipe beyond the pipe design pressure. The meeting did raise two issues, however, that had the potential to cause problems. The first issue involved the lack of a requirement for relief valve protection in certain hydrostatic test setups. This issue was resolved by revising SWP/P-P-4 to require relief valve protection during all overpressure tests except those using a static head of water. The second issue involved the use of relief valves with too wide a range of setpoints. This was resolved by Bechtel's purchase of relief valves with narrower ranges and the establishment of a separate facility for setting and controlling the issuance of relief valves. No other significant trends or potential trends had been identified.

The startup program utilizes a Startup Deviation Report (SDR) to identify nonconformances. The inspector inquired as to the status of the SDR trending program and determined that it was still under development and not yet functional. The inspector expressed his concern as to the importance of getting the system functional so that construction related problems can be identified and fed back to Bechtel for corrective action.

#### 8. Improper Tagging

An individual notified the NRC that he was allegedly fired for telling his supervisor he planned to contact the resident NRC inspector about an improper tagging incident. Construction tagging practices are not normally inspected by the NRC but by OSHA. The tagging incident involved the individual's failure to verify proper tagout of a piece of electrical equipment. The individual stated the tagging procedure was vague regarding his responsibilities. As a result of the improper tagging incident, the individual was suspended from work for several days without pay. When he was notified of this suspension, he told his supervisor he intended to notify the NRC resident inspector of the incident. The same day he was fired. Review of his subsequent discrimination complaint by the Department of Labor did not substantiate his claim. NRC followup covered review of the licensee's controls for equipment tagging. Significant changes in tagging practices were found in that the Bechtel tagging procedure was replaced in order to more rigidly control tagging and to eliminate any ambiguities regarding supervisory checkout. All tagging of energized equipment has now been placed under the PSE&G operations tagging system. Bechtel personnel involved with tagouts have been trained in the application of the licensee's procedure and selected Bechtel supervisors were given tagging authority and are responsible for verifying that requested tags are properly hung. Permanent plant equipment is not to be energized until after turnover to PSE&G. No inadequacies in these tagging practices were found. (RI-84-A-34)

9. Torus Modification

The torus modification work activity was completed during this report period with the exception of connecting the SRV vent lines to the T-quenchers. The inspector visually inspected completed work and torus cleanliness. No discrepancies were identified.

10. Bechtel Indoctrination and Training Program

The inspector reviewed the recently completed Bechtel Indoctrination and Training Program Manual to ensure it was consistent with previous commitments made by management to improve the site training for crafts and supervision. The manual appeared to be consistent with management commitments.

11. 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.