

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 50-354/84-10 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: June 25 - August 5, 1984

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

8/10/84  
Date

Approved: E. M. Kelly  
for J. Strosnider, Chief, Project Section 1C

8/14/84  
Date

Summary:

June 25 - August 5, 1984 (Report No. 50-354/84-10): Routine resident safety inspection (95 hours) of work in progress including equipment maintenance, turn-over packages, seismic II/I program, instrumentation, proposed drywell modification to accommodate reactor water level sensing lines, and housekeeping. The inspector also made tours of the site, reviewed licensee action on previous inspection findings, evaluated licensee responses to Construction Deficiency Reports, and investigated an incident involving an individual's threat to expose incidents of falsification of records and drug abuse at Hope Creek to the NRC. One inspector followup item was opened to track the implementation of the seismic II/I program. It was determined that a problem involving lack of information exists in the instrumentation area. Five outstanding items were reviewed for closure and three were closed. Finally, the investigation into the individual's threat disclosed that there was one incident of records falsification and that no facts were available to pursue the drug abuse concerns.

8409240202 840828  
PDR ADDCK 05000354  
Q PDR

## DETAILS

### 1. Persons Contacted

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

A. Barnabei, Principal QA Engineer  
J. Ciccone, Manager Startup and Test  
A. E. Giardino, Manager, QA Engineering and Construction  
R. Griffith, Principal Staff QA Engineer  
M. Metcalf, Principal Startup QA Engineer  
G. Owen, Principal Construction Engineer

#### 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 Engineer  
N. Griffin, Project Field Engineer  
C. Headrick, Project QC Engineer  
A. Landi, Lead Pipe Support QC Engineer  
D. Long, Field Construction Manager  
R. Mackey, Assistant Resident Project Engineer  
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

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

J. Cockroft, Site Engineer  
R. McKenna, Chief Site Engineer  
C. Brinson, Site QA Manager

## 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, and protection of installed instrumentation. No unacceptable conditions were identified.

## 3. Seismic II/I Program

As addressed in USNRC Regulatory Guide 1.29, the licensee must have a program in effect to control the design and construction of non-safety-related equipment such that during a seismic event non-safety-related equipment will not break loose and impair the functionality of safety-related equipment. This program at Hope Creek is called the Seismic II/I program. The inspector reviewed the following documents that pertain to this program:

- Bechtel Technical Specification G-052, Seismic II/I Evaluation Program, Rev. A
- Bechtel Design Criteria for Seismic Classification and Seismic Design, D 7.2, Rev. 4
- Bechtel Design Criteria for Procedure for Documentation and Criteria of Plant Separation, D 7.3, Rev. 1
- Bechtel Design Criteria for Field Routed Procedure, D 7.9, Rev. 0
- Bechtel Drawing E-1406-0, Raceway Notes, Symbols, and Details, Rev. 1
- Bechtel SWP/P-E-110, Raceway Hanger Installation, Rev. 5
- Bechtel PQCI C-2.30, Erection of Seismically Qualified Acoustical Ceilings (Seismic II/I), Rev. 4
- Bechtel PQCI C-2.40, Installation of Bullet-Resistant Doors and Windows (Seismic II/I), Rev. 0
- Bechtel PQCI FM-1.00, Installation of Deluge Water Spray and Sprinkler Systems (Seismic II/I and Fire Protection), Rev. 0

- Bechtel PQCI P-1.80, Installation of Seismic Category II/I Piping Systems, Rev. 1
- Bechtel PQCI SC-1.09, Erection of Masonry Walls (Seismic II/I and Fire Protection), Rev. 0

This review was conducted to determine the scope and effectiveness of implementation of the program. It was determined that the II/I program is a three part program as follows:

- (1) Various commodities, such as raceway and ductwork supports in areas of the plant containing safety-related equipment are considered safety-related (even though they may be non-safety-related) and, therefore, receive QC inspection after installation.
- (2) Project Engineering, based on a II/I review using the scale model of the plant, identified on the design drawings various items as QS or QSH which dictates QC inspection.
- (3) Project Engineering will perform a II/I walkdown of all completed areas of the plant containing safety-related equipment and observe for II/I situations that were not analyzed and inspected. These situations will then be analyzed and identified to QC for inspection.

In summary the scope of the II/I program involves generic and individual identification of non-safety related items that could impact safety-related equipment during a seismic event and QC inspection of these items to ensure correct installation. The scope of the program appears to meet FSAR commitments and exceeds those commitments in that II/I items receive both Field Engineering and QC inspection whereas the FSAR commitment for inspection is either Field Engineering or QC inspection.

The inspector determined that implementation of the program was behind schedule as regards the Project Engineering walkdowns. It was also determined that the documents controlling the walkdowns and QC inspections contained inconsistencies and in some cases were not capable of implementation without revision. The particular discrepancies are as follows:

- (1) If additional work is performed in a room or area after it has been walked-down for II/I concerns, an additional II/I review will be required. Procedures do not address this requirement. Bechtel and licensee procedures should address the need for a II/I walkdown each time additional work is done.

- (2) As regards Bechtel Spec G-052 Attachment 1: This attachment is the vehicle whereby Project Engineering identifies a II/I concern as a result of their walkdown activities and is described in G-052 paragraph 1.1.4 as a self-closing document. As it presently exists, it is opened and closed solely by Project Engineering yet may require QC involvement. A process needs to be established to coordinate QC involvement prior to Project Engineering closure. Additionally, it should be made clear on this document whose signatures are required.
- (3) G-052 generically exempts certain items from II/I concerns based on the premise that they are not installed in any rooms/areas containing safety-related items. Because of ambiguity in the defined areas of the plant that contain safety-related equipment, it is necessary to ensure that HVAC ductwork installed under the M-635 specification does not exist in areas/rooms containing safety-related items. If M-635 ductwork is routed in safety-related areas it will be necessary to coordinate QC inspection of the ductwork supports.
- (4) Paragraph 2.3.4 of G-052 which discusses Q<sub>S</sub> and Q<sub>SH</sub> items, does not include instrument lines, trays, and associated supports. However, instrument FSK's do show Q-flagged lines and trays. Paragraph 2.3.6 states instrument lines and trays are generically exempt from II/I concerns. D7.9 implies a II/I concern for instrument lines and trays. The inconsistency within G-052 and D7.9 should be resolved.
- (5) It is not clear that stairway runners are QC inspected. It should be verified that stairway runners in rooms/areas containing safety-related equipment are QC inspected.
- (6) Paragraph 3.3.4 of G-052 requires clarification as to the intent of the use of the special two-hole machined-block bolted clamps as II/I instrument tubing supports. The implication is that these clamps are required yet II/I instrument tubing and supports are not being inspected by QC nor is there a QCI written to address the inspection.
- (7) The note in paragraph 3.5.2.b of G-052 that states "Q<sub>SH</sub> designations on isos and hanger drawings does not necessarily indicate evaluations were made and are acceptable" requires clarification. (This note was deleted in Rev. 0 of G-052 but its implications require clarification.)



- (8) Paragraph 3.5.6 of G-052 requires where there is not a practical solution to a II/I situation, that administrative controls be implemented. Bechtel needs to establish a method whereby they identify and notify the licensee of those II/I solutions that involve establishment and implementation of administrative controls.
- (9) It is necessary that Bechtel QA establish and implement a II/I audit program.
- (10) Paragraph 4.4.2.6.3 of D7.2 requires QC inspection of II/I supports. Raceway supports in the areas containing safety-related equipment are generically considered safety-related and II/I, however, based on economic considerations, non-safety-related conduit clamps and certain types of tray supports in these areas are not receiving QC inspections. Clarification of this inconsistency is required.
- (11) Paragraph 4.4.2.6.3 of D7.2 and Attachment A to G-052 discuss the use of a QC sampling inspection program to generically accept certain items as II/I acceptable. QC has no such inspection sampling program in place though it appears this method will be used as part of the II/I program. It is necessary for QC to develop a program.
- (12) Paragraph 2.3.6 of G-052 generically exempted certain items from II/I concerns. It was determined by the inspector that calculations substantiating these exemptions were not complete and that it was not reasonable to assume that a calculation could be used to exempt certain of the items included. Clarification of this paragraph is required.
- (13) Paragraph 2.3.3.d of G-052 implies ladders and handrails are exempt from II/I concerns and QC inspections. Paragraph 4.4.1.f of D7.3 states ladders and handrails should be reviewed for II/I impact as part of the Model Separation Review. Because of the scale of the model review, it was not possible to identify all possible interactions involving ladders and handrails and, therefore, it is not reasonable to generically exempt them. This question requires resolution.
- (14) Figures 1-6 contained in D7.9 show all radwaste as containing no safety-related equipment. This is inconsistent with paragraph 2.1.3 of G-052 and paragraph 6.1 of D7.9. It is necessary that

those rooms/areas containing safety-related items be uniformly identified in all applicable documents and that these rooms/areas be reviewed to determine that items that were generically exempted were appropriate. For example, HVAC ductwork supports were generically exempt because they received QC inspection. In reality, however, only M-735 ductwork supports received QC inspection and those installed to M-635 did not. Additionally, if non-category I electrical raceway supports were not installed per SWP/P-E-110 per the exemption permitted in paragraph 3.0, it will be necessary to reevaluate the acceptability of their installation.

- (15) Paragraph 8.2.1.v of E-1406 specifies different raceway support spacing for seismic category I versus non-seismic Category I supports. Has this fact been taken into account in generically exempting tray supports from II/I concerns because they are designed to seismic Category I criteria as stated in paragraph 2.3.4 of G-052 and other design criteria documents?
- (16) Paragraph 7.1.3 of D7.9 states that "... instrument tube trays routed over safety-related commodities shall use the Q-tray support span at 5' apart as delineated in Specification J-825." A review of this specification and reference documents disclosed a 6' spacing requirement except at higher elevations. This inconsistency needs to be resolved. Additionally, the last sentence of this paragraph states "It is not required to identify these trays on the tray routing drawings with QSH designation." Because the trays are not identified as II/I, it is not clear how they will be installed or inspected to meet the requirements of this paragraph.
- (17) Instrumentation QC does not have a PQCI to inspect II/I instrumentation installations. There are instrumentation drawings with sections flagged as Q<sub>S</sub> or Q<sub>SH</sub> which imply QC inspection. This should be resolved. Additionally, it is not evident that tubing supports specified in paragraph 3.3.4 of G-052 are being installed on II/I lines nor is there QC verification of the installation status. This requires clarification.
- (18) Paragraph 3.2 of G-052 discusses scheduling of walkdowns and states that an initial walkdown will be conducted approximately sixteen weeks before the scheduled area turnover. Based on the facts that certain areas have already been turned over, others are expected in the near future and no systems have received a II/I walkdown, the approximate sixteen week lead time on the initial walkdown is not being adhered to.

The inspector met with licensee and Bechtel personnel to discuss and identify these discrepancies. Action was underway at the end of this report period to resolve them. Resolution of the discrepancies will be followed by the inspector and discussed in a subsequent report. (354/84-10-01)

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

- A. (Open) Unresolved Item (354/83-10-01): The effect of pipe fitting excess stiffness and weight on the flexibility and seismic analyses of safety-related piping systems. The NRC Staff evaluated the effect of overthickness in pipe fittings and concluded that the effect on seismic loadings is insignificant. They also concluded that thermal loads on oversized fittings could affect equipment nozzle loading such that equipment nozzles could be unacceptably overloaded, and that the potential exists for problems with restraints and piping other than tees and elbows when considering heavy fittings and thermal expansion stresses.

Bechtel Project Engineering made fitting thickness measurements on different sized fittings manufactured by various companies and used in different systems and substituted worst case conditions into the stress analysis for each system. The results of this stress recalculation indicated that, although some loads increased, the piping system design still fell within ASME code allowable limits. As regards equipment nozzle loads, it was determined that all vendor allowable loads were met for all the analyzed equipment. Their final conclusion was that the Hope Creek piping and support design, which is based on nominal thickness dimensions, adequately represents installed piping and supports.

The Bechtel letter discussing their position on this issue also stated that current discussions in the ASME Section III working group on piping design indicate a consensus of opinion which would allow a variance from nominal fitting weights of -20% to +33%. Of the 770 fittings weighed by Bechtel at Hope Creek, all were found to be within this range except 5 tees. It was stated that tees do not have an effect on system flexibility and have negligible effect on dead weight analysis as demonstrated by sample calculations. Because fitting thickness correlates directly and conservatively to fitting weight, it follows that if wall thickness readings fall within the nominal range (nominal +30%,  
-20%

thermal loading of anchors, piping, and equipment nozzles. (See discussion in NRC Inspection Report 83-13 wherein it was reported that Bechtel investigations determined that the fittings' overweight percentage was substantially less than the fittings' overthickness percentage.)

General Electric, who supplied some main steam and all the recirculation system piping, did not perform an investigation into this question. This item will remain open pending a final GENEBO position on this issue and acceptance of both Bechtel's and GENEBO's positions by NRC licensing.



- B. (Closed) Noncompliance (354/84-01-01): Failure to reenergize diesel generator alternator heaters after performing maintenance. On the date of the violation power was restored to the heaters. Subsequently, various procedures were revised to ensure maintenance and storage conditions are restored in a timely manner and training sessions were held with affected personnel to discuss the revised procedures and to stress the importance of adhering to these procedures. A list of storage "do's" and "don'ts" was generated in poster form and displayed in appropriate locations in the power block, office buildings, and warehouses. The diesel generator alternators were megged in accordance with manufacturer's instructions with the results indicating no degradation.

5. Review of Nonroutine Events Reported by the Licensee

- A. By letters dated September 17 and October 20, 1982, and January 18, 1983, the licensee reported and discussed a significant construction deficiency in accordance with the requirements of 10 CFR 50.55(e) involving intrusion of cement grout of unknown quantity into the air gap between the free standing containment drywell and the exterior concrete shield wall. NRC Inspection Reports 82-12, 13, 15; 83-01, 02, 04, 12; and 84-08 discussed the progress of corrective actions and closed this deficiency report with the exception of a pending FSAR revision to reflect the tunneling within the shield wall and the existence of a reduced air gap in certain locations. Amendment 6 was issued on 6/28/84 and discussed the above two items, thus closing this construction deficiency. (354/82-00-06)
- B. By letter dated June 6, 1984, the licensee reported a potential significant construction deficiency in accordance with the requirements of 10 CFR 50.55(e) involving mounting of silicon control rectifiers (SCR's) in the diesel generator potential transformers and exciter control panels. The particular problem involved the potential for cracked SCR's due to excessive mounting pressure and was reported to the NRC via Part 21 by Basler Electric - the supplier to Colt Industries. Basler Electric inspected the SCR's on 6/26/84 and determined that the SCR's were properly mounted. The NRC inspector witnessed the inspection activities. Based on the as-found condition of the SCR's, this item is considered not reportable and is closed. (354/84-00-05)

6. Authorized Nuclear Inspector (ANI) Falsification of Records and Drug Abuse Concerns

The licensee informed the inspector of a telephone call between an ANI and a Bechtel employee wherein the ANI threatened to notify the NRC of records falsification and drug abuse problems at Hope Creek. The ANI had been

assigned to Hope Creek but was not at the time of the telephone call. In an attempt to determine the validity of the concerns, the inspector interviewed various personnel within Bechtel and an onsite ANI who had worked with the involved ANI. The inspector also reviewed ANI and Bechtel records. It was determined that the subject ANI had been involved in an apparent records falsification incident. In particular, an ANI holdpoint for fitup of a pipe joint had been initialed by someone other than the ANI whose initials appeared on the QCIR. The ANI identified this problem to his management and several meetings between Bechtel and Hartford Insurance (the ANI's employer) ensued. It was never determined who forged the ANI's initials but a records search was done to determine if there were any other incidents. No other problems were identified. Based on the system used by the ANI's prior to signing off a QCIR hold point, it is improbable that a records falsification problem would not be immediately identified: each ANI maintains a personal log of those joints he inspects and this log is compared to each QCIR to ensure he actually performed the inspection before the hold point is signed on the QCIR. As a result of the incident, the particular weld joint was cut out, re-fitup, and re-welded.

Interview of the ANI by his management failed to identify any specific drug abuse incidents.

The ANI was subsequently interviewed by Hartford Insurance management to determine the extent of his concerns. During this interview it was reported that he referred to the single incident discussed above and had no other concerns. The inspector had no further questions regarding this incident.

#### 7. Containment Penetrations - Review of Procedures

The inspector reviewed the following drawings and procedures as part of a review to determine the scope and ASME Code acceptability of a proposed modification to the drywell to accommodate additional reactor vessel water level instrument lines:

- Bechtel Work Plan/Procedure Record XC-2329, Reactor Shielding Wall Core Drill for Penetration J
- Bechtel Technical Specification FSK-C-458, Core Drilling of Unit 1 Drywell Shield Wall, Rev. 1
- Bechtel PQCI G-3.10, Reactor Shield Wall Core Drilling and Cutting of Drywell Liner Plate, Rev. 0
- Bechtel Design Specification C-152(Q), Furnishing, Designing, Detailing, Fabrication, Delivery, and Erection of Primary Containment, Addendum 1

- Bechtel Drawing C-0789-0, Reactor Building Drywell Shield Wall Wall Penetrations, Rev. 9
- Bechtel Drawing C-0795-0, Reactor Building Drywell Shield Wall Air Gap Details, Sheet 2, Rev. 7
- Bechtel Drawing A-0928-0, Detail Plans and Elevations, Rev. 2
- Bechtel DCN No. 4 to Drawing C-0929-0, Rev. 13
- Bechtel Drawing C-0929-0, Containment Vessel Requirements Drywell Penetration Schedule, Rev. 13
- Bechtel Drawing C-0787-1, Sht. 1, Reactor Building Drywell Shield Wall Wall Embeds, Rev. 13
- Bechtel Drawing C-0930-0, Containment Vessel Requirements Drywell Penetration Details, Rev. 15
- Bechtel DCN No. 10 to Drawing C-0930-0, Rev. 15

This review resulted in two questions by the inspector:

- (1) What were the leakage test pressure and inspection requirements, and
- (2) Why wasn't a full penetration weld specified for the joints re-sealing the drywell.

Several meetings were held at which time these questions were discussed and resolved. As regards the first question, the leakage test pressure will be at drywell design pressure and a visual inspection using a boroscope will be used. The second question was resolved by clarification that the new drywell shell welds would not be inaccessible and, therefore, did not have to meet ASME Section XI requirements specifying they be butt welded. The inspector had no further questions.

#### 8. Status of Preoperational Instrumentation Program

The inspector reviewed the status of the preoperational instrumentation program. This review included instrument related indices, discussions with involved personnel, and observation of installed instrumentation. Instrumentation installed in the plant was found to be well protected. An attempt was made by the inspector to compare the range and units of several installed instruments to the instrument design to ensure the correctness

of instrument installation and effectiveness of the supplier quality program. The inspector discovered in trying to do this that no instrument indices contain information correlating the instrument number to the range and required units of the instrument. A time consuming effort was required to search through the purchase orders and many related change documents to obtain the information.

Based on the discovery of this cumbersome system, the inspector met with instrumentation personnel involved in the preoperational test program to determine how they were verifying correctness of instrument installation. From this meeting it was determined that they were having similar problems and had identified other problems such as:

- (1) With regard to information contained in the Instrument Index and Setpoint Register it is in many cases missing, incomplete, or inaccurate.
- (2) Incorrect and inconsistent scale ranges on installed instrumentation.
- (3) Lack of jumper configuration on multifunction modules.
- (4) Skid mounted instruments not listed in Instrument Index - the number of skid mounted instruments was estimated to account for approximately one fourth of all plant instruments.
- (5) Based on the difficulty in obtaining needed information, it takes just over one hour per instrument to establish the instrument calibration data card required for instrument calibration. (When considering there are 30,000 plus instruments, this projects into a large scale manpower loading situation.)
- (6) Lack of vendor information.
- (7) Design changes continue to be generated.
- (8) Accurate loop calibration data sheets are not available.

Further discussions of these problems indicated that licensee management has been made aware of them but has been unable to satisfactorily address them. The inspector expressed his concern over this apparent management ineffectiveness and was informed that additional management attention is being directed to correct the problems.



9. 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.