

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

Region I

Report No. 50-354/82-12

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: September 9-October 3, 1982

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

10/8/82  
date signed

for J. A. Varela  
A. A. Varela, Reactor Inspector

10/25/82  
date signed

Approved by: L. E. Tripp  
L. E. Tripp, Chief, Projects Section 2A

date signed  
10/25/82  
date signed

Inspection Summary:

Unit 1 Inspection of September 9-October 3, 1982 (Report No. 50-354/82-12):

Areas Inspected: Routine unannounced safety inspection by the resident inspector (81 hours) of work in progress including polar crane rail installation, concrete preplacement and placement activities, pipe and support installation, structural steel erection, material and equipment storage, HVAC duct and support installation, housekeeping and fire protection, service water concrete pipe installation, backfill and compaction activities, rebar installation and reactor pressure vessel cleanup, welding, and NDE activities. The inspector also made tours of the site, evaluated licensee action on previous inspection findings, reviewed records pertaining to lateral truss fabrication, followed up on results of NCR trending inspection, and witnessed action taken by the licensee to investigate and resolve construction deficiency reports.

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During this inspection report period the licensee reported a potential construction deficiency involving possible intrusion of grout into the nominal 2 inch air gap between the free standing containment drywell and the concrete shield wall. A regionally based specialist inspector performed an inspection of the activities involved with this potential problem and also performed inspection on foundation and backfill activities in response to NRC TI 2512/8 and NRC Circular 81-08. The regionally based inspection involved 24 hours on site. The resident inspector assisted in these activities.

Results: Violations: Two (failure of QC to identify discrepancies during performance of inspection activities as described in paragraph 3 and failure to implement procedures controlling safety related welding activities as described in paragraph 4).

## DETAILS

### 1. Persons Contacted

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

A. Barnabei, Site 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  
D. Gillis, Assistant Project Superintendent  
R. Hanselman, Lead Welding Engineer  
M. Henry, Project Field Engineer  
D. Long, Project Superintendent  
R. Mackey, Resident Project Engineer  
J. R. McCoy, Lead Contracts QC Engineer  
G. Moulton, Project QA Engineer  
J. Pfeiffer, Assistant Project Construction QC Engineer  
L. Rosetta, Field Construction Manager  
D. Sakers, Assistant Project Field Engineer  
D. Stover, Project Superintendent, Contract Administration  
S. Vezendy, Lead Welding QC Engineer

#### General Electric Installation and Services Engineering (GEI&SE)

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

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

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

#### J. Rich Steers (JRS)

J. Gagliano, Resident 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 polar crane rail installation, rebar installation, concrete preplacement and placement activities, structural steel erection, housekeeping and fire protection, service water concrete pipe installation, backfill and compaction activities, material equipment and storage, and HVAC duct and support installation.

No items of noncompliance were identified.

## 3. Review of Nonroutine Events Reported by the Licensee

- A. On July 17, 1981, the licensee reported a significant construction deficiency in accordance with the requirements of 10 CFR 50.55(e) involving Varglass tie wrap slippage and unraveling that could result in hindering safety related relay operation in GE supplied motor control centers. In a licensee letter dated 8/17/81, it was stated that a silicone sealer would be applied at the tie wrap knot and also between the knot and the cable to prevent unraveling and slippage. By letter dated 5/21/82, the licensee informed the NRC of their revised plans to replace the Varglass tie wraps with Tefzel tie wraps. On 8/24/82, the inspector witnessed electricians removing the Varglass tie wraps and replacing them with Tefzel tie wraps on a one-to-one basis. The inspector noted that this replacement activity was being monitored by Bechtel QC and surveilled by Bechtel and licensee QA.

On 9/29/82, licensee personnel stated that the subject tie wraps had been replaced and the construction deficiency report was ready for closure. At this time the inspector reviewed Bechtel Management Corrective Action Request (MCAR) No. 26 and associated documentation and found that the MCAR was closed and all inspection activity completed. It was stated to the inspector at this time that the decision had been made that the Varglass tie wraps would remain in the cable troughs since there was no possibility of these tie wraps slipping between relay contacts. On 9/30/82, the inspector physically inspected

at random three compartments in each of the two MCC's involved (10D251 and 10D261) to ensure the replacement activities were complete, the Tefzel tie wraps were correctly installed, and the panels were clean.

The results of this inspection disclosed two Varglass tie wraps remaining in one compartment of MCC 10D251. Additionally, it was observed that strands of Varglass contaminated all the compartments inspected. It was noted that the Tefzel tie wraps were correctly installed for tightness. The failure of QC inspection to thoroughly inspect the MCC's to ensure complete replacement of the Varglass tie wraps and to ensure the Varglass strands were removed from the panels and that none were lodged in relay contacts is contrary to Criterion X of Appendix B of 10 CFR 50 and is an item of noncompliance. (354/82-12-01) It should be pointed out that QC inspection performed subsequent to the NRC inspector's finding, identified additional Varglass tie wraps.

This construction deficiency report will remain open pending resolution of the violation. (354/81-00-05)

On September 17, 1982, the licensee reported a potential 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. This was observed following completion of grout placement outside the drywell. Inspections of this event involved detailed review of technical engineering and quality control requirements established to form the air gap. The inspector reviewed and discussed with responsible engineers and inspectors the quality assurance and controls imposed prior to and during grout placement No. 1C-X-F004 outside the drywell. This placement was made September 15 and 16 and involved approximately 650 cubic yards of grout pumped into drop pipes.

The outside of the drywell is designed with a 2" air gap separation from the exterior concrete shield wall. The 34' radius hemispheric lower chamber of the drywell is supported on a concrete filled pedestal within the drywell outer skirt. Taken in elevation, the skirt appears on the time clock to be at 4:30 and 7:30 positions. The air gap is provided above these time clock positions circumferentially. This separation from the shield wall permits freedom for expansion and movement of the drywell under operating, accident and seismic conditions. The circumferential concrete shield wall was successfully constructed with the air gap above the 3:30 and 8:30 clock position by using reinforced

fiberglass forms with 2" of sand backing against the drywell. The construction technique necessitated leaving a gallery between the time clock positions of 3:30 and 8:30 and the outer skirt (4:30 and 7:30) for draining the 2" of sand backing. After draining the sand, grout placement No. 1C-X-F004 filled the gallery.

Following completion of placement 1C-X-F004, grout was observed in seven penetrations. Subsequent to the identification of the problem a full scale investigation commenced and involved licensee and Bechtel site and home office personnel. The inspectors observed activities in progress to determine the extent and locations of grout in the air gap using 12', 25', and 30' fiber scopes. The results were mapped. Additionally, hydrolaser operation to remove grout from the annular space of two penetrations to provide access to the drywell for further mapping was observed. The activity in progress to investigate the problem appeared adequate and planned.

The following quality control records were reviewed and discussed with quality personnel and field engineers who were present during grout placement No. 1C-X-F004, as part of an effort to determine if the grout intrusion problem resulted from inadequacies in planning or inspection activities:

- preplacement check and verification of the fiberglass for tightness and adequacy of bracing support
- air gap clearance
- in process verification of the above during grout placement
- QC control and verification of liquid head and time of set of grout
- QC control and verification of maintaining level of grout in the gallery pool by slick line changes for selective injection into twenty-six circumferential drop pipes at top of gallery
- QC control at the batch plant of the grout mixed and tested, including grout cube time of set and seven day strength tests of samples during the placement.

This review determined that planning and inspection was adequate and that the likely cause of the problem was failure of the fiberglass material forming the boundary of the air gap. (354/82-00-06)

4. Containment (Penetrations) - Observation of Work and Work Activities

The inspector observed in process welding activities on Main Steam expansion joint assembly 1-XJN-1B. The expansion joint was undergoing fitup modifications per FCR P-3287 and FCO P-6567 to resolve a reverse slope condition caused by the containment penetration to which it attaches. The inspector questioned the welder regarding the whereabouts of the QCIR controlling the work. The welder stated there was no QCIR. Upon further investigation the inspector discovered that the welder had only the rod room copy of the filler metal issue slip (Form WR-6). The particular work in progress at the time included weld buildup of the expansion joint end prep and weld repairs of punch marks in the base metal.

Review of the FCR and FCO indicated that the weld repairs to the punch marks were not authorized. The inspector questioned the welder as to why he was welding over the punch marks and he responded that he was following his foreman's orders. The expansion joint falls under ASME III Subsection NC. This Code requires that base metal repairs identified and made in the field require both a surface exam by either MT or PT and a volumetric exam by RT. Because only the foreman and welder were aware of the base metal rework and QC was not, there was no control to impose Code NDE requirements on this activity.

Further investigation into the reasons for the welder having the rod room copy of the WR-6 and lack of a QCIR at the work area, revealed that none of the requirements of the basic procedure controlling issuance of weld filler metal had been followed. In particular Bechtel SWP/P-19, Rev. 9, Field Welding Activities, requires that Weld Request Form WR-1 be initiated by the craft superintendent, general foreman, or foreman at least two days prior to performing any welding. The WR-1 must then be signed by the Lead Field Welding Engineer and Lead Welding QC Engineer who then initiate the proper documentation including the QCIR which specifies and controls the welding and inspection activities and the WR-6. Because the WR-1 was never initiated, a QCIR was never generated. How the WR-6 was initiated and weld rod issued without the WR-1 form was of serious concern to the inspector. An answer to this question was not available at the end of the inspection report period,

however, a Stop Work Order had been issued to stop all welding activity on this expansion joint and NCR-1836 had been issued to identify and track resolution of the problems.

The failure of Bechtel to implement the requirements of SWP/P-19 to control jobsite welding and welding QC activities is contrary to Criterion V of Appendix B of 10 CFR 50 and is an item of noncompliance. (354/82-12-02)

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

(Closed) Unresolved Item (354/82-05-04): Lack of a well defined and understood definition of the GENEBO/Bechtel jurisdiction at NSSS boundaries. This unresolved item was also discussed in NRC Inspection Report 82-07. Bechtel issued SWP/P-133, Rev. 0, Bechtel/GE Nuclear Steam Supply System Interface Guidelines. The inspector met with licensee, Bechtel, and GENEBO personnel to discuss this document and to ensure that all parties agreed to its contents. The results of this meeting served to satisfy the inspector that the interface problem had been highlighted and that Bechtel and GENEBO will in the future be more sensitive to interface problems. The inspector considers this item closed.

(Closed) Noncompliance (82-07-01): Failure to bend test shear connectors in accordance with AWS D1.1 requirements. The inspector randomly witnessed bend testing of shear connectors onsite. No major problems resulted from the onsite bend tests. The inspector also reviewed Bechtel MCAR No. 35 which was written to address both the site problem and the source of the problem at Lakeside Bridge and Steel Company. The following facts were stated on the MCAR and are pertinent to closure of this noncompliance.

- A 50.55(e) evaluation was made and this problem was determined not reportable.
- NCR's 1673 and 1677 were opened and closed to address the 36 beams involved onsite.
- Bechtel Supplier Quality Representatives (SQR's) were informed of the problem and the AWS requirements and bend testing of studs was made a witness/inspection requirement.
- 6062 studs were inspected. Of those that required bend testing 29 failed.



- Lakeside's stud welding and inspection procedures had not been approved by Bechtel at the time the studs were welded in the shop. Their procedures are now approved.
- The Quality Plan for the Lakeside purchase order and technical specification (C-151A(Q), Rev. 0) was revised to require 100% inspection of shear connector type studs.

In summary both Lakeside QC and the Bechtel SQR did not understand the AWS D1.1 requirements for bend testing shear connector studs. This resulted in the inspector's original finding. Appropriate action was taken to bend test studs per AWS requirements, train appropriate personnel, and impose more specific controls on bend testing through modifications to the Lakeside and Bechtel quality programs. The inspector considers this item closed.

(Closed) Noncompliance (354/82-07-02): Inadequate qualification and certification of W-H QC personnel. The bulk of the corrective action required for closure of this item had been initiated shortly after identification of the violation and was described as part of the writeup of the finding. The one key event that has taken place subsequent to the issuance of NRC Inspection Report 82-07 was complete removal of W-H QC from site activities effective 9/1/82. Bechtel QC personnel took over total responsibility for onsite QC activities of ductwork and support installation. W-H QC still maintains responsibility for all quality activities in their offsite fabrication shop, however. As part of the followup action to this finding, the qualifications of all W-H shop QC personnel were reviewed which resulted in identifying one unqualified inspector. He was downgraded and all his work reinspected. Based on the initial and subsequent corrective action taken, the inspector considers this item closed.

(Open) Noncompliance (354/82-07-03): Failure to obtain excavation permits prior to drilling expansion anchor bolt holes to a depth equal to or greater than 6". The licensee reviewed all walls for embedded pipe or conduit where anchor bolts requiring holes equal to or greater than 6" depth were installed. This investigation determined there was no potential for damage. Additionally, Bechtel imposed controls on future drilling operations by using short bits, marked bits, and stops on the drilling apparatus. The inspector considered Bechtel's response complete. The inspector asked if similar controls had been imposed on subcontractors who install expansion anchor bolts. The answer to this question was no. This item will remain open pending enforcement of similar controls on all subcontractors who install expansion anchor bolts.

#### 6. Nonconformance Report (NCR) Trending Review

The inspector reviewed approximately 150 NCR's involving all engineering disciplines as part of a task to verify that the site NCR trending system was functioning effectively. This review required establishing trends based on recurring problems identified by the NCR's. Upon completion of the establishment of trends, the inspector compared the trends he identified with those identified by the site trend analysis program maintained by the Bechtel site QA department. The results of this comparison indicated that the NRC trends agreed closely with some of the Bechtel QA trends but that many of the more recent NCR's were not included as part of the total Bechtel NCR count for a given trend. Additionally, the NRC had identified trends that Bechtel had not. Investigation into these discrepancies disclosed that, as of 3/82, Bechtel QA had reassigned the job of classifying NCR's to a non-technical person.

As a result of the discrepancies, Bechtel QA assigned a technical person to review and trend all the NCR's from 3/82 to the present. This effort resulted in the identification of eight trends, some new and others recurring. One significant new trend identified a problem with construction proceeding with work prior to QC performing required inspections. Bechtel QA initiated a Quality Action Request (QAR) to followup their concern with this trend. Bechtel QA committed to using technical personnel to trend all future NCR's.

The inspector emphasized his concern regarding the sequence of events that lead to the breakdown in the trending program. He also expressed concern over the construction/QC trend and stated he would followup on corrective action taken to prevent further occurrences. This is considered an inspector followup item. (354/82-12-03)

#### 7. Response to IE Circular No. 81-08: Foundation Materials

NRC Circular No. 81-08, issued May 29, 1981, on foundation materials, requires no specific response from the licensee where no soil compaction construction deficiencies were identified and no corrective actions were required. The recommended action for construction permit holders contained in the Circular is intended for those facilities with ongoing soils work activities. The licensee's response to the Circular for the Hope Creek site states they reviewed the impact of the Circular and determined that adequate measures have been and are being taken in design and construction to preclude the problems with foundation and backfill materials identified in the Circular. The licensee stated that none of these problems exist at the Hope Creek site. The paragraph that follows is a chronological listing of NRC inspection reports which provide verification of the design and

construction adequacy. Evidence is provided to support the conclusion that foundation and backfill materials supporting and proximate to safety-related structures are placed in accordance with design bases requirements. Additionally, the NRC reports identify a construction settlement monitoring program. The program is reviewed and evaluated annually. It relates to settlement during the construction phase and compares actual versus predicted settlements for each structure. No problems have been identified.

Previous NRC Inspection Reports relating to foundation and backfill materials:

<u>Report Number</u>	<u>Activity Inspected</u>
354, 355/76-04	Site Preparations and Foundations
354, 355/76-07	Site Preparation - Control of Dewatering and Excavation
354, 355/77-02	Design Change - Use of Structural Backfill Site Preparation and Foundations
354, 355/77-04	Testing of Structural Backfill, Design Change Notice to NRR, Foundation Embankment
354, 355/77-08	Resolution of NRC identified UNRs on structural backfill
354, 355/78-01	Safety of dewatered foundation
354, 355/78-07	Placement and compaction of backfill
354, 355/78-11 79-05 79-07	Site Tour observations of placement and backfill compaction
354, 355/80-01	Review of Dewatering and Settlement Survey Records
354, 355/80-09	Backfill and Compaction Activities
354, 355/80-10	Safety Related Backfill Activities

<u>Report Number</u>	<u>Activity Inspected</u>
354, 355/80-13	Field Engineering Surveillance of Main Excavation Dewatering and Heave/Settlement Program and, Evaluation by Others
354, 355/80-19 80-20 80-21	Site Tour observations of soil backfill activities
354, 355/81-09	Structural Backfill and Compaction
354, 355/81-14	Service Water Intake Structure Foundations
354, 355/81-16	SWIS Post Excavation Foundation Studies
354, 355/81-18	SWIS soils investigation and construction changes to cofferdam to accommodate foundation conditions encountered during excavation
354, 355/82-01	SWIS Foundation - Notification to NRC/NRR of changes
354, 355/82-04	SWIS Foundation approval by PSE&G's consultant geologist
354, 355/82-06	Heave/Settlement Monitoring Program - Annual Report Review
354/82-08	Service water piping, trench excavation and backfill

NRC report 80-13 above identifies PSE&G's soils/foundation consultant as the Dames and Moore Company. They conclude that the extensometer and optical survey data developed from the heave/settlement measurement program was reasonable. This was predicated on the corresponding loads imposed up to March, 1980. D&M state that the bearing stratum performed as anticipated. NRC report 82-06 updates the inspector's review of plots of observed load/settlements for five power block basements up to February 1982. The NRC inspector's review of these plots confirmed the Bechtel evaluation that

settlements are leveling off. Bechtel concludes present settlements are within the limits of design.

Based on established design requirements and verification that soil selection, fill, and compaction activities are accomplished under the direction of a qualified geotechnical engineer, and that the settlement monitoring program in effect during the construction phase verifies that the measured settlement values are within the projected values, it follows that excessive settlements of Category I structures would be highly improbable and would be identified if they occurred.

This activity closes NRC Circular 81-08.

#### 8. Reactor 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 witnessed PT and UT examination of several welds and also observed welding activities in progress. The annular space between the inner vessel wall and the shroud which contains the jet pumps was thoroughly cleaned and inspected and closed off using plastic and plywood. The inspector witnessed the final inspection for cleanliness.
- B. In NRC Inspection Report 82-09, the inspector raised four questions regarding FDI No. 60/79450 which detailed installation of additional supports for the Core Spray headers. Discussions during this report period resolved the questions as follows:
1. The welding operation has no negative metallurgical impact on the existing cladding and RPV material.
  2. No hydrostatic retest is required as discussed in ASME III Subsection XI.
  3. A demonstration of UT cladding thickness measurements on a clad piece of carbon steel (the piece simulated a portion of the vessel wall with cladding) served to prove that cladding thickness measurements by UT are possible.
  4. The Code question remains outstanding. Discussions of this question disclosed that GENEBO does not consider this work to be ASME Code work. The inspector stated that if the material added was a pipe support, then he felt the ASME Code would apply. If, however, the material added is a restraint, then the GENEBO contention could be correct.

The inspector observed welding and NDE activities associated with installation of the pads on the vessel wall.

No items of noncompliance were identified. (354/82-09-03)

9. Exit Interview

The inspector met with licensee and contractor personnel during this inspection report period at which time they summarized the scope and findings of their inspection activities.