U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-352/84-22
50-353/84-07

Docket Nos. 50-352
50-353

License Nos. CPPR-106 Priority -- Category B
CPPR-107 A

Licensee: Philadelphia Electric Company
ATTN: Mr. John S. Kemper
Vice President
Engineering and Research
2301 Market Street
Philadelphia, Pennsylvania 19101

Facility Name: Limerick 1 & 2

Inspection At: Limerick, Pennsylvania

Inspection Conducted: May 2-4, 1984

Inspectors: Samuel D Reynolds — 6/8/84
S. D. Reynolds, Jr., Lead Reactor Engineer — date

Samuel D Reynolds for — 6/8/84
H. Kerch, Lead Reactor Engineer — date

F M Campbell for — 6/8/84
R. Harris, NDE Technician — date

F M Campbell — 6/8/84
R. Campbell, NDE Technician — date

Samuel D Reynolds for — 6/8/84
S. K. Chaudhary, Senior Resident Inspector — date

Approved by: J. Durr — 6/17/84
J. Durr, Chief Materials and Processes Section, EPB, DETP — date

Inspection Summary: Combined Inspection Report for Inspection Conducted May 2-4, 1984 (Report Nos. 50-352/84-22; 50-353/84-07)

Areas Inspected: An announced inspection by four regionally based welding and Nondestructive Examination (NDE) specialists and the resident inspector was made on structural welds associated with hangers and supports, and building structural members. There was also followup on two previously identified inspection findings. The inspection involved 4 hours by the resident inspector and 76 hours by regionally based inspection personnel.

Results: No violations were identified.

DETAILS

1.0 Persons Contacted

Philadelphia Electric Company (PECO)

* D. Clohecy, QAE
* J. Corcoran, Field QA Branch Head
* E. Gibson, Quality Assurance Engineer (QAE)
* D. Marascio, QAE
* R. Scott, Supervising Engineer - Construction Division
  H. Vollmer, Civil/Structural Supervisor

Bechtel Power Corporation (Bechtel)

  G. Bell, Project QAE
* R. Bulchis, Resident Project Engineer
  M. Green, Field Welding Specialist - M&QS
* J. Gwin, Project Construction Manager
  A. Jenan, Field Welding Engineer, Weld Test Group
* G. Kelly, Lead Site QAE
  L. Memula, Plant Design Supervisor
  K. Quinter, Quality Control Engineer
* J. Richard, Welding Specialist
* C. Soppet, Project Manager
* K. Stout, Project Field Quality Control Engineer
  P. Witucki, Resident Engineer

Nuclear Regulatory Commission (NRC)

  R. Campbell, NDE Specialist
  S. Chaudhary, Senior Resident Inspector
* R. Harris, NDE Specialist
* H. Kerch, Lead Reactor Engineer
* S. Reynolds, Lead Reactor Engineer
* J. Wiggins, Senior Resident Inspector

* denotes those present at exit interview

2.0 Hanger and Support Design

Discussions with Bechtel personnel representing the Design Engineering function at Bechtel, San Francisco, were held to determine their position on engineering conservatism in structural, hanger and support, and pipe whip restraint designs. Bechtel indicated the following:

- In using the AISC design rules, the maximum allowable used in design calculations is 18 KSI rather than 21 KSI which is permitted in certain situations. The 1.33 permissible seismic allowable factor is not utilized.

- In an analysis of approximately 80 hangers designed for seismic loading:
  - 98% had design margins greater than 1.5
  - 92% had design margins greater than 3.0
  - 70% had design margins greater than 5.0
- There are a large number of four sided all-around welds where welds on two sides would adequately meet design requirements.
- No credit is taken for the actual weld metal properties which are close to 90 KSI tensile strength when the minimum is 70 KSI. No credit is taken for actual base metal properties which also exceed minimums used for design.

No violations were identified.

3.0 Structural Steel Weld Inspection

An independent measurements inspection was conducted by a regionally based Nondestructive Examination (NDE) Specialist inspector accompanied by a regionally based NDE Technician on civil/structural weldments to verify the adequacy of the licensee's QA/QC visual inspection program. The welds inspected were selected by the NRC Resident Inspector to include 85 welds which were accessible for inspection and were originally inspected by the inspector mentioned in open item 50-352/76-06-01. The inspection was conducted using Bechtel site procedures.

The following welds were inspected:

QCIR	LOCATION		WELDS INSPECTED	COMMENTS
C-192-W-1-8	G & 24.5	EL. 220	1	Column splice
C-192-W-1-8	E & 27.5	EL. 220	1	Column splice
C-195-W-1-11	E & 26	EL. 201	2	Clip angles
C-195-W-1-17	N. of D&26	EL. 201	8	C8 to W24 (2)
C-195-W-1-17	N. of D&29	EL. 201	4	C8 to W24
C-197-W-1-4	F & 15.5	EL. 216	3	Beam to column
C-197-W-1-4	S. of F&15.5	EL. 216	8	Clip angles
C-201-W-1-7	23 line 1st 4 beams			
	N. of D	EL. 252	16	Clip angles
C-201-W-1-9	E & 29	EL. 252	1	Clip angle (partial)
C-201-W-1-9	E & 30.5	EL. 252	1	Clip angle
C-201-W-1-9	E & 30.5	EL. 252	1	Clip angle (partial)
C-204-W-1-2	23 & G	EL. 282	4	Beam to column clips
C-204-W-1-2	23 & G + 7'	EL. 282	4	Beam to column clips

C-204-W-1-2	23 & H	EL. 282	4	Beam to column clips
C-204-W-1-2	J & 23.5	EL. 282	4	Beam to column clips
C-204-W-1-2	J & 24.5	EL. 282	2	Beam to column clips
C-204-W-1-2	J & 24.5	EL. 282	2	Beam to column clips
C-192-W-1-8	J & 30.5	EL. 220	1	Column splice - undercut observed evaluated to be acceptable
C-195-W	J & 17	EL. 217	2	Incomplete weld observed which was subject of NCR 8194 dated 9/18/83
C-193-W-1-10	J & W17 J & S of 15.5		16	Convexity noted on top of 2 welds

(1) partial welds also inspected

The inspector verified that 26 welds on the following QCIR's were uninspectable at the time of this inspection due to being covered by concrete:

C-274-W-1-6
C-604-W-1-59
C-198-W-1-13
C-201-W-1-5

The inspection verified existing licensee weld inspection records and the welds. They were found to be acceptable and in accordance with the applicable site engineering requirements and acceptance criteria.

No violations were identified.

4.0 Hanger and Support Weld Inspection

An independent measurements inspection was conducted by a regionally based welding specialist inspector and a regionally based NDE technician. Welds to be inspected were selected by the NRC Resident Inspector and represented a total of 55 welds originally inspected by the inspector mentioned in open item 50-352/76-06-01. Some of the welds originally selected were not available for inspection due to redesign which eliminated the hangers or due to being covered by insulation. The NRC Resident Inspector and the licensee selected other welds to substitute for those determined to be unavailable for inspection.

The following welds were inspected:

QCIR/HANGER	LOCATION	WELDS INSPECTED
• M-51-HBB-5-2A/		
GBB-117-H-5	Area (A) 16-TOS201	3
• M-62-HBC-5-1		
HBC-143-H10	A12 - TOS215	4
HBC-152-H11	A12 - TOS213	6
HBC-152-H4	A12 - TOS215	7
• M-69-HBD-5-1/		
HBD-69-H12	A8 - Elevation (E) 200	2
HBD-69-H13	A8 - E 200	2
• M-184-HBD-5-1/		
HBD-69-H9	A8 - TOS216	4
HBD-70-H11	A8 - E 200	2
HBD-70-H12	A8 - E 200	7
HBD-73-H4	A8 - E 200	2
• M-207-EBB-5-1/		
EBB-134-H2	A11 - TOS215	9
• M-207-HBC-5-2/		
HBC-147-H6	A11 - TOS215	4
• M-246-HBC-5-1		
HBC-151-H9	A15 - E 177	3

In addition to the above welds which were inspected with their applicable detail drawings, the inspectors also visually inspected other welds in the immediate vicinity for workmanship and welding defects. A total of approximately 300 other welds were visually inspected for all normal criteria except weld size.

The welds were inspected for conformance to Bechtel Specification 8031-G-20 which meets AWS D1.1 as amended by the specification in paragraph 4.0. The welds met or exceeded the size and quality requirements.

The inspector reviewed the system used by the licensee and Bechtel to utilize the authority granted the "Engineer" in AWS D1.1 (as discussed in paragraph 1.1 of the Commentary) to modify certain requirements of the basic code. This applies to differences between Bechtel 8031-P-319, paragraph 4.7.13.1, and AWS D1.1.

The welds inspected showed good workmanship and demonstrated good technique skills on the part of the welders, even in configurations which limited electrode manipulation.

The inspector reviewed the welder performance qualification system for iron worker and pipe fitter welders who generally are responsible for the welding on building structures, hangers and supports, respectively. The iron worker welders are qualified solely on plate per AWS D1.1; whereas, the pipe fitter welders are required to pass an entrance pipe test normally followed by further qualification on plate test assemblies. The applicable Bechtel performance qualification documents are WQ-2 and WQ-1, respectively, for the above mentioned workers. It was noted that WQ-2, paragraph 1.3.1, permits welders qualified to ASME Section IX to be qualified for AWS D1.1 welding.

The inspector reviewed Bechtel procedure qualification records (PQR) documents related to demonstration of structural welding usability and dimensional conformance to the intent of AWS D1.1. These documents apply to welding of structural members including unistrut, sheet metal, and skewed angle configurations. The PQR's reviewed were 715, 865, 866, 867, 607, 845, 830, 840, 841, D645, D642, 686, 610, 551, 611, 687, 608, 688, 689, 606, 690, 691, 842, and 793.

No violations were identified.

5.0 Licensee Action on Previous Inspection Findings

a. (Closed) 50-353/76-06-01 (Infraction). This non-compliance was related to the welding of structural shapes utilizing an extension piece on the welding electrode holder (a broomstick was utilized). The inspector questioned the qualification of the welder performing the weld with the

"broomstick", but wrote a violation based on failure of the welds to meet AWS D1.1 workmanship requirements. The licensee took immediate steps to prohibit the unauthorized use of this specialized technique. The competence of the Bechtel QC inspector, who signed off that the "broomstick" welds met AWS requirements, was questioned by the licensee and an effort made to completely re-inspect all welds which had been accepted by the subject inspector. The licensee's actions are indicated in the following letters to Region I:

- Kemper (PECO) to Murley, File: QUAL 1-2-2 (353/76-06), dated 4/19/84
- Kemper to Murley, File: QUAL 1-2-2 (353/76-06), dated 10/11/83
- Boyer (PECO) to O'Reilly (NRC), File: QUAL 1-2-2-2 (76-06), dated 11/10/76

This item is also discussed in inspection reports 50-352/84-17 and 50-353/84-05.

In addition to the licensee's corrective actions, specialist inspectors from Region I conducted visual reinspections of welds initially accepted by the subject inspector as indicated in paragraphs 3.0 and 4.0 of this report. The NRC is satisfied with the corrective actions and has no more questions on this violation. This item is considered closed.

b. (Closed) 81-04-04 (Unresolved item). This item concerns the interpretation of Bechtel Specification GWS-SN, paragraph 5.4, which appears to require 100% verification of interpass temperature controls between every weld pass. The licensee clarified their interpretation of this paragraph as follows:

"It is not industrial practice to interpret interpass temperature verification to assure that this (GWS-SN paragraph 5.4) should mean that a check must be made following every weld bead deposited. The interpass temperatures indicated in the welding procedures are sufficiently high to negate the possibility of a welder exceeding these temperatures using manual techniques due to the cooling rates caused by the base metal heat sinks. Paragraph 5.4 of GWS-SN refers to the methods used to determine interpass temperatures and does not mean that checks shall be made after every bead."

This clarification is acceptable to the NRC and there are no additional questions on this subject. This item is considered closed.

6.0 Exit Interview

The NRC inspectors met with the licensee's representatives (denoted in Paragraph 1) at the conclusion of the inspection on May 4, 1984. The inspector summarized the findings of the inspection. The licensee acknowledged the inspectors comments. No written material was given to the licensee during the course of the inspection.