THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
ILLUMINATING BLDG. • PUBLIC SQUARE • CLEVELAND, OHIO 44101 • TELEPHONE (216) 623-1350 • MAIL ADDRESS: P. O. BOX 5000
Serving The Best Location in the Nation

Dalwyn R. Davidson
VICE PRESIDENT
SYSTEM ENGINEERING AND CONSTRUCTION

July 23, 1979

Mr. James G. Keppler, Director
Region III
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

RE: Perry Nuclear Power Plant
Final Report on Unit I Zero Degree
Pipe Whip Restraint Structure

Dear Mr. Keppler:

This letter constitutes the report required by 10CFR50.55(e) on the deficiency concerning weld quality of the Unit I Zero Degree Pipe Whip Restraint structure. This item was first discussed in a telephone conversation between M. R. Edelman of the Cleveland Electric Illuminating Company and Mr. Jim Konklin of the NRC Region III, Office of Inspection and Enforcement on June 27, 1979. Deficiencies in manufacture of the Unit I Zero Degree Pipe Whip Restraint required extensive repair and evaluation to establish the adequacy of this structure.

DESCRIPTION OF THE DEFICIENCY

The restraint structure cantilevers from the face of the biological shield wall and is the primary support for four (4) main steam valves, two (2) feedwater lines, the high pressure core spray line, and some miscellaneous platform steel.

During site receipt inspection of the restraint on April 12, 1979, three (3) Nonconformance Reports (NCRs) were generated. Two (2) dealt with problems concerning backing bars in the areas of material traceability, lack of full penetration welds at backing bar joints, excessive separation of the backing bar from the base metal, and backing bars not running the full length of the weld (NCRs 1159 and 1160). The third NCR (1158) dealt with weld quality covering such areas as arc strikes, slag, weld splatter, undercut, craters, underfill and weld profile. The material specification for the restraint, SP-669, called for ultrasonic testing (UT) of all the full penetration groove welds on the restraint. While repair work was progressing on these weld areas, major defects were discovered. In the documentation submitted to the site with the restraint, these defective welds had been marked as satisfactory with regard to UT. As a result of

478 356 (4) B019 S/D

these observations, a sampling re-UT was performed on site which indicated various defective welds. As a result of this sampling NCR 1159 was dispositioned as not meeting specification requirements and was sent back to the primary vendor Newport News Industrual Corporation (NNIC) to bring into compliance with specification requirements. As a result of extensive testing by NNIC, this situation was evaluated to be a possible significant deficiency and the NRC Region III was verbally notified on June 27, 1979. The restraint was fabricated by Ranor Incorporated, Westminister Massachusetts, a subcontractor of J. T. Ryerson & Son, Inc., Philadelphia, Pa., who is a subcontractor of NNIC.

ANALYSIS OF SAFETY IMPLICATIONS

It is possible that installation of the structure as received on site could have created a potential for structure failure when called to function during an accident condition. Since the item was sent back for complete rework and repair, no full safety analysis of the original defects has been conducted.

CORRECTIVE ACTION

Based upon the results of the sampling UT on site, it was deemed necessary to return the restraint to NNIC for repair since site conditions were not conducive to the magnitude of the re-UT to be performed along with any needed repair. The restraint was shipped to Greenville Metals Manufacturing (GMM) in Greenville, Tennessee, which is a NNIC facility. To assure the integrity of the restraint the following actions were taken:

1. Twenty-two (22) holes were cut on the structure to permit access to the interior of the restraint for re-UT of the welds. These cutouts permitted access to approximately 99% of the total length of the welds which were originally UT'd. The remaining 1% could not be re-UT'd without excessive cutting of the restraint which would necessitate scraping of the structure. The acceptability of the portions of the weld not re-UT'd were evaluated on the quality of the remaining portion of the weld UT'd.

2. All defects found in the weld by either UT, magnetic testing (MT), or visual inspection (VT) were repaired.

3. All backing bars exposed were visually inspected at backing bar intersections for continuity and separation from the parent material. Backing bars not meeting specification requirements were repaired. All backing bars not exposed through the cutouts were evaluated and found acceptable based upon the NDE testing performed at Greenville of the weld joints, and also by engineering evaluation.

478

~~461~~ 357

4. Gilbert Associates, Incorporated (GAI) Engineering evaluated which of the twenty-two cutouts made must be replaced for structural reasons. Eleven (11) of the cutouts were replaced by NNIC with the use of backing bars and a full penetration weld. A 100% MT root layer, every fourth layer or 3/8 inch (whichever was less), and the final layer, and a 100% VT on all cutout welds was performed.

5. A resident project inspector was placed at the Greenville facility by Gilbert Associates. The inspector witnessed all re-UT, MT, and needed repair.

   Cleveland Electric Illuminating Company Quality Assurance, and Engineering, and also Gilbert Associates Quality Assurance, and Engineering witnessed portions of the in-process repair and final inspection.

6. NNIC was requested to evaluate the MT portion of the documentation package since the UT portion was in question. NNIC proposed to validate Ranor's MT by re-examining with prod MT all final surfaces which had been previously examined by MT.

7. NNIC production and quality management committed to tighter control of subcontractors. NNIC took complete responsibility for all needed UT, MT, and VT along with all repair.

8. To prevent the same types of problems on the Unit II Zero Degree Pipe Whip Restraint, the structure was removed from Ranor, Inc. and taken to the Greenville facility. All welding done on the restraint will be 100% visually inspected and all welds requiring UT will be re-UT'd at Greenville.

   Further fabrication will be made at Greenville and once again NNIC, CEI, and GAI will monitor the remaining fabrication and testing.

TESTING RESULTS

The results of the re-UT completed at GMM for the Unit 1 Restraint are thus:

A total of 8,679 inches of weld were re-UT'd with 293 inches of defects found, 3.4%, 172 inches of weld were inaccessible to complete re-UT, 86 inches of which were given 50% re-UT coverage, with the remaining (1%) receiving no coverage at all. About 95% of the defects were slag inclusions. The remaining 5% included a lack of fusion running between slag inclusions. Of the defects found, approximately 60% were considered borderline with respect to UT rejection. All defects found, borderline or not, were repaired and documented.

~~401~~ 358
478

The results of the re-MT validation completed at GMM for the Unit I Restraint are thus:

> NNIC proposed to validate Ranor's MT by re-examining with prod MT all final surfaces of welds which had been previously examined by MT. The re-MT was performed on all welds that were exposed with the cutouts for the re-UT and which were not reworked during repair of defective UT'd areas. A total of only 11½ inches of defect were noted during this examination. The majority of these defects could be attributed to a unique joint design and configuration rather than to poor workmanship. All defects found were repaired. The specification itself (SP-669) required a minimum inspection of 10% of the length of the weld to be MT'd.

IN SUMMARY

All retesting and repair have been completed and a final inspection at GMM was conducted on July 17, 1979. All welds on the restraint have been accepted by means of either testing or engineering evaluation. The restraint was received on site on the 19th of July and passed receipt inspection.

The Zero Degree Pipe Whip Restraint has been thoroughly tested and evaluated for structural integrity and it does now meet the requirements of the fabrication specification. An extensive and coordinated effort was made by all parties, CEI, NNIC, and GAI, to insure that the restraint does meet the requirements for the Perry Project.

Very truly yours,

Murray R Edelman for

Dalwyn R. Davidson
Vice President
System Engineering and Construction

DRD/MRE:ge

cc. Victor Stello, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

478
~~464~~ 359