

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 88-10/88-11

Docket No. 50-254/50-265

License No. DPR-29/DRP-30

Licensee: Commonwealth Edison  
P.O. Box 767  
Chicago, Illinois 60690

Facility Name: Quad Cities

Inspection At: Moline Illinois

Inspection Conducted: April 18 through April 29, 1988

Inspectors: H. W. Kerdh  
H. W. Kerdh, Senior Reactor Engineer

6/2/88  
date

Richard H. Harris  
R. H. Harris, NDE Technician

6/2/88  
date

Approved by: Jack Strosnider  
J. R. Strosnider, Chief, Materials, and  
Processes Section, EPB, DRS, Region I

6/6/88  
date

Inspection Summary and Conclusions: A routine announced inspection conducted on April 18 through April 29, 1988. (Report No. 50-254/88-10, 50-265/88-11).

Areas Inspected: A routine, announced inspection was conducted at Quad Cities Nuclear Power Station Units 1 and 2. Included in this independent measurements inspection were safety-related piping weldments, components and supports selected from plant modification packages and the inservice inspection plan. Specific areas inspected were selected from the Anticipated Transient Without Scram (ATWS), Atmospheric Containment Atmospheric Dilution (ACAD), Residual Heat Removal (RHR), Feedwater (FW) and Condensate Systems.

All inspections were performed to applicable codes, standards and procedures.

### Summary and Conclusions

The quality of the piping welds, pipe hanger modifications and piping support welds inspected was good. However, five unresolved items were identified. These items involved (1) documentation of visual weld inspections; (2) incomplete ultrasonic inspection data packages; (3) lack of weld inspection reference points required by Section XI of the ASME Code; (4) improper application of ASNT experience requirements for nondestructive examination personnel; and, (5) failure of a nondestructive examination personnel qualification procedure to include ANSI 45.2.6 experience requirements (all examination personnel were found to possess adequate experience despite the procedure deficiency). These items indicate a weakness in the nondestructive examination program administered by the Commonwealth Edison Safety Material Analysis Department. This weakness appears to be the result of inadequate staffing.

The inspection team noted that Quad Cities is the cleanest BWR facility of its vintage that they have inspected.

## Details

### 1.0 Persons Contacted 30703

#### Commonwealth Edison

\*Dan Gibson, Regulatory Assurance Supervisor  
\*Tom Tamlyn, Project Superintendent  
\*J. Ford, Assistant QC Supervisor  
\*Gary Tagatz, Inservice Inspection  
Wesley W. Witt, Level III  
Curtis Smith, Quality Control Supervisor  
Gary Spedl, Technical Services  
Charles Norton, Quality Assurance Engineer  
Richard I. Bax, Station Manager  
Mack Turczynski, Site Engineer  
Rich Roby, Services Superintendent  
Michael Brown, Quality Assurance

#### United States Nuclear Regulatory Commission

D. H. Danielson, Section Chief RIII  
\*Kaven D. Ward, Reactor Inspector RIII

\*Denotes those attending the exit meeting.

The inspector also contacted other administrative and technical personnel during the inspection.

### 2.0 Independent Measurements - NRC Nondestructive Examination and Quality Records Review of Safety Related Systems

During the period of April 18 through April 28, 1988 an onsite independent measurements inspection was conducted at Quad Cities Nuclear Power Station Units 2 and 3. This inspection was conducted by NRC regional-based inspectors and contracted Nondestructive Evaluation (NDE) personnel. The purpose of this inspection was to verify the adequacy of the licensee's nondestructive examination program during plant modification. This was accomplished by duplicating, as near as possible, those examinations required by code and regulations, and evaluating the results. The examinations performed by the NRC were selected from the following modification packages and systems.

#### MODIFICATION PACKAGE

#### SYSTEM

MO-4-1-85-036  
MO-4-1/2-87-072

RESIDUAL HEAT REMOVAL (RHR)  
ANTICIPATED TRANSIENT WITHOUT  
SCRAM (ATWS)  
MISSILE SHIELD DOORS (MSD)  
ATMOSPHERIC CONTAINMENT  
ATMOSPHERIC DILUTION (ACAD)

MO-4-1-86-016  
MO-4-1-86-031

### 3.0 Nondestructive Examination

#### Liquid Penetrant Examinations (57060)

Twenty (20) safety related pipe weldments and adjacent base material (1/2 inch on either side of the weld) were examined using the visible dye penetrant technique per NRC procedure NDE-9, Rev. 0 in conjunction with the licensee's procedure NDT-D-2, Rev. 5. Included in this sample were ASME Class 2 weldments from the Residual Heat Removal (RHR) System.

Results: No violations were identified.

#### Magnetic Particle Examination (57070)

Two (2) safety related pipe weldments and adjacent base material (1/2 inch on either side of the weld) were examined using the dry magnetic particle technique per NRC procedure, NDE-6, Rev. 0 in conjunction with licensee's procedure NDT-B-1, Rev. 2. Included in this examination were ASME Class 2 carbon steel pipe weldments selected from the High Pressure Safety Injection (HPSI) System.

Results: No violations were identified.

#### Thickness Measurements for Erosion/Corrosion

Approximately one hundred and sixty (160) thickness measurements were taken at six different areas to determine if wall thinning had occurred due to erosion/corrosion. This was accomplished by laying out a 1 or 2 inch grid (determined by pipe size) on the area to be examined and recording the thickness measurements obtained by the use of a NOVA D-100 thickness gauge. The areas selected included, one 10 inch 90 degree elbow to pipe component, one 10 inch pipe and one 6 x 8 inch reducer pipe located in the Condensate System.

Results: No violations were identified.

#### Visual Examination (55155)

Twenty two (22) safety related pipe weldments and adjacent base material (1/2 inch on either side of the weld) were examined in accordance with NRC procedure NDE-10, Rev. 0, Appendix A, site procedure NDE/VE-7 Rev. 0, associated site QC Documentation, and drawings. The examinations were performed specifically to identify any cracks or linear indications, gouges, leakage, or arc strikes with craters or corrosion, which may infringe upon the pipe minimum wall thickness. Mirrors, lights and weld gauges were used to aid in the inspection and evaluation of these weldments.

Results: No violations were identified.

### Visual Examination Hanger/Supports

A visual inspection of welds, hangers, support components and attachments was conducted. Included in this inspection were items selected from the Atmospheric Containment Atmospheric Dilution (ACAD) and the Anticipated Transient Without Scram (ATWS) Systems. The inspections were conducted in accordance with NRC Procedure NDE-10, Rev. 0, and the licensee's applicable drawings, and visual inspection records contained in the modification packages (MO-4-1/2-87-072 and MO-4-1-86-031). Specific attributes looked for were loose or broken members; corrosion; missing, damaged or wrong parts; excessive clearance and gaps; and improper installation. Weldments were inspected in accordance with the Nuclear Construction Issues Group (NCIG-01) Visual Weld Acceptance Criteria (VWAC). Specific attributes looked for were cracks, weld size, incomplete fusion, overlap, underfilled craters, weld profiles, undercut, porosity, weld length and location; arc strikes, surface slag or spatter. Those component inspected after protective coatings had been applied could not be evaluated for cracks or fusion type defects.

Re: The inspector reviewed licensee modification packages MO-4-1-86-031 and MO-4-1/2-87-07. These modification packages indicated that visual inspection of structural welds were to be performed using the attributes and acceptance criteria in the Nuclear Construction Issues Group Visual Weld Acceptance Criteria (VWAC) for structural welding at Nuclear Power Plants. The licensee indicated these inspections were performed using the VWAC criteria. However, the results of the inspections were not recorded in appropriate detail. The inspection data sheets only indicated if the weld was found acceptable or unacceptable and did not provide sufficient information to confirm that all the VWAC attributes had been evaluated. The licensee indicated that they were committed to inspections performed in accordance with VWAC and the results of all future VWAC inspections will be properly recorded (see section 3.0 Paragraph 3.2.3 of the VWAC document). This is an unresolved item pending licensee action and NRC review. (50-254/88-10-01)

### Ultrasonic Examination (57080)

The inspector selected two (2) safety related 10 in. pipe weldments for independent ultrasonic inspection. Those welds selected were ASME Class 2 carbon steel weldments from the High Pressure Safety Injection (HPSI) System. The ultrasonic examinations were performed using a Krautkramer USL-48 flaw detector in accordance with NRC procedure NDE-1, Rev. 0, Commonwealth Edison procedure NDT-C-2 and associated ultrasonic test data reports. Instrument calibration (linear verification) was performed using NRC procedure NDE-2 Rev. 0. A distance amplitude correction curve (DAC) was constructed using the licensee's calibration standard no. 99933QC. To ensure repeatability of ultrasonic examinations, instrument settings and search units (transducers) were matched as near as possible to those indicated by the licensee's ultrasonic data reports.

Results: No violations were identified.

#### 4.0 Review of Site NDE Procedures and Manuals

The following procedures were reviewed for compliance to the licensee's FSAR commitments and applicable codes, standards and specifications.

- NDT-D-2 Rev. 5 LIQUID PENETRANT
- NDT-C-2 Rev. 0 THICKNESS MEASUREMENTS
- NDT-C-2 Rev. 15 ULTRASONIC INSPECTION (PIPE WELDS)
- NDT-B-1 Rev. 2 MAGNETIC PARTICLE
- NDT-C-37 Rev. 1 ULTRASONIC INSPECTION (WELD OVERLAY)
- NDE/VE-7 Rev. 0 VISUAL INSPECTION
- 1-1-0 Certification of Inspection and NDE personnel
- QA Manual
- GE procedure QC-2 Rev. 4 Qualification and certification of NDE and visual personnel

Results: No violations were identified.

#### 5.0 Inservice Inspection (ISI) (73051)

The inspector reviewed the outage cycle 2, Spring of 1988 ISI program and the ISI 10 year plan.

A sampling of Inservice Inspection documentation packages including magnetic particle and ultrasonic examination reports were reviewed. The examination reports were reviewed to verify compliance with ASME Section XI Code requirements for accuracy of the documentation and evaluation of examination data.

Results: During this inspection the licensee's Safety Material Analysis Department (SMAD) had accepted the ultrasonic data for recirculation weld O2A-510. The licensee's ultrasonic data examination report stated that the indications detected in the subject weld during this outage had not changed in dimension since it was evaluated in the previous outage. Based on evaluation of the licensee's record of inspection, the inspector could not determine that the indications had grown since the previous outage examinations. Further investigations revealed that the ISI contractor (GE) had copies of the 1986-87 outage ultrasonic examination results that included ultrasonic indication plots for this weld with all indications marked as to type and location. The inspector compared this information with the ultrasonic indication plots of the 1988 outage and concluded that the indications had no dimensional changes since the last outage. However, the indication plots required in order to perform this evaluation were supplied by the contractor (GE) and were not included in the licensee's inservice inspection report of record.

The inspector also identified deficiencies in data recorded on licensee's ultrasonic examination data sheet, Form NDT37. This form is inadequate to ensure accurate and consistent recording of ultrasonic data.

For example, Form NDT37 for weld number 20AS10 had several incorrect data entries. Reference for indication number 1 under the section entitled "Ind. Axial Length" had a recorded value of 0.60. However, the inspector determined that this value actually was the "W" location dimension rather than the form required axial total dimension. Indication number 78 under the section entitled "Ind. Circ. Length" had a recorded value of 71.2". This was found to represent the location in inches from the reference point at which the inspection began. The information recorded on the form was not what the form required. Based on the above inspection findings, the present form requires clarification to ensure proper data entry. These deficiencies in the licensee's ISI documentation are considered an unresolved item pending Licensee action and NRC review (50-265/88-11/02).

During this inspection the NRC inspectors also determined that the site ISI program requirement and ASME Section XI, Appendix III, Supplement 2 are not being met in that a reference system has not been established for the inspection starting point, direction of the examinations and the location of the center line of the welds. This item is unresolved pending licensee action and NRC review (50-265/88-11/03).

Review of reactor vessel relief request NOCR-1 and NOCR-2 indicated that relief was being requested for one too many circumferential welds in request NOCR-2. All drawings reviewed indicated a total of six circumferential welds, including one circumferential weld in the beltline region. The licensee stated the relief request would be corrected during the next change. The inspector had no further questions in regard to this item.

#### 6.0 Personnel Qualification/Certification (57900)

Nondestructive examination and visual examination qualification and certification records for personnel from site quality control and two site contractors were reviewed. The acceptance standards used for the inspection were SNT-TC-1A (1980), ANSI 45.2.6 (1973) and ASME Sections XI (1980) and site procedures.

##### Commonwealth Edison Personnel

Personnel records and Commonwealth procedure 1-1-0 Revision 24 were reviewed. Several problems were disclosed. One of the problems identified relates to improper use of the SNT-TC-1A 25% rule in Commonwealth procedure 1-1-0 Revision 24. The SNT 25% rule is to be applied to initial training of full time NDE personnel in two or more NDE methods at the same time. The Commonwealth Edison procedure permitted the use of the SNT 25% rule for other than full time NDE personnel qualification. One individual was certified using the 25% rule when the majority of his work time was spent on QC activities not involving actual application of NDE. Thus, the Commonwealth Edison NDE personnel could fulfill the procedure requirement without satisfying the ASME required minimum experience. The inspector provided copies to Commonwealth Edison (SMAD) of SNT-TC-1A interpretations with regard to the 25% rule for qualification and certification of full

time nondestructive examination personnel. The intent of SNT-TC-1A is clear. Actual performance of work in the method is required for that time to be claimed as work experience. The subject was discussed at length during the inspection and at the exit. This item will be carried as unresolved pending licensee review of their qualification and certification of personnel in the use of the 25% rule, within Commonwealth Edison nuclear program.

Results: This item is unresolved pending the licensee's review of all NDE certification records to determine where the 25% rule was used and NRC review (50-265/88-011/04).

#### General Electric (GE)

Twenty-one GE personnel NDE qualification and certification records were reviewed and found satisfactory. Four GE personnel qualification and certification visual records were reviewed. The GE personnel met the ANSI 45.2.6 (1973) experience requirement. However, GE procedure QC-2 Rev. 4 does not meet the ANSI 45.2.6 1973 experience requirement in that it requires three months rather than four years experience. Also, Commonwealth Edison procedure 1-1-0 Rev. 24 does not properly address the experience requirement of ANSI 45.2.6 (1973). Specifically, procedure 1-1-0 requires only one year of experience for a high school graduate to qualify for level II certification while ANSI 45.2.6 requires four years experience. Commonwealth Edison informed the inspector that the visual section of procedure 1-1-0 Rev. 24 was undergoing rewrite and that the requirements of ANSI 45.2.6 would be met.

Results: This item is unresolved pending Commonwealth Edison review of their procedure 1-10 Revision 24 and determination if unqualified personnel have signed off ASME inspections. (50-265/88-011/05)

#### Morrison Construction Company

Two visual personnel qualification records were reviewed and found acceptable.

Results: No violation was identified

### 7.0 Staffing

Commonwealth Edison's Safety Material Analysis Dept (SMAD) has three NDE Level III's and three NDE Level II's assigned. Their duties consist of monitoring Commonwealth Edison NDE procedures, supplying review personnel at the 12 Commonwealth Edison nuclear plants during outages and responding to all the other reactive NDE needs at these nuclear plants plus the NDE requirements for Commonwealth Edison fossil facilities. The deficiencies in the NDE program noted above, indicate that the SMAD staffing level may not be adequate to effectively support the NDE program needs.

## 8.0 Attachments

Attachment No. 1 is a tabulation of specific pipe weldments examined and results.

## 9.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or violations. Unresolved items are discussed in paragraphs 3.0, 5.0 and 6.0.

## 10.0 Management Meetings (30703)

Licensee management was informed of the scope and purpose of the inspection at the entrance interview on April 28, 1988. The findings of the inspection were discussed with licensee representatives during the course of the inspection and presented to licensee management at the exit interview (see paragraph 1 for attendees).

At no time during the inspection was written material provided to the licensee by the inspector. The licensee did not indicate that proprietary information was involved within the scope of this inspection.

WELD/ISO	CLASS	MT	THICK.	UT	PT	VI	EROSION/CORROSION
1-3406-ED-1	2	N/A	ACC.	N/A	N/A	N/A	ACCEPTABLE
1-3205-B-3	2	N/A	ACC.	N/A	N/A	N/A	ACCEPTABLE
2-3205-B-6	2	N/A	ACC.	N/A	N/A	N/A	ACCEPTABLE
2-3304-ED-2	2	N/A	ACC.	N/A	N/A	N/A	ACCEPTABLE
2-3205-ED-3	2	N/A	ACC.	N/A	N/A	N/A	ACCEPTABLE
2-3304-D-10	2	N/A	ACC.	N/A	N/A	N/A	ACCEPTABLE
FW-2A	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM A
FW-3A	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM A
FW-4A	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM A
FW-5A	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM A
FW-6A	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM A
FW-2B	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-3B	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-4B	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-5B	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-6B	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-2C	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-3C	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-4C	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-5C	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-6C	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM B/C
FW-2D	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM D
FW-3D	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM D
FW-4D	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM D
FW-5D	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM D
FW-6D	2	N/A	N/A	N/A	ACC.	ACC.	RHRSW ROOM D
FW-2331-1	2	ACC.	N/A	ACC.	N/A	ACC.	HPSI ROOM
FW-2339-1	2	ACC.	N/A	ACC.	N/A	ACC.	HPSI ROOM