U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-455/86018(DRS)

Docket No. 50-455 License No. CPPR-131

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Byron Station, Unit 2

Inspection At: Byron Site, Byron, IL

Inspection Conducted: June 18-19, 24-25, 30, July 1 and 10, 1986

Inspector: K. D. Ward 7/18/86
Date

Approved By: D. H. Danielson, Chief
Materials and Processes
Section 7/18/86
Date

Inspection Summary

Inspection on June 18-19, 24-25, 30, July 1 and 10, 1986 (Report No. 50-455/86018(DRS))
Areas Inspected: Unannounced, routine safety inspection of radiographs of shop and field welds and resolution of previous inspection findings.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

*R. Klingler, Project QC Supervisor
R. Moravec, Project Mechanical Supervisor
E. Martin, QA Superintendent
J. Woldridge, QA Supervisor
J. Porter, Construction Supervisor
A. Rosenback, QA Supervisor
W. Witt, NDE Supervisor
E. Briette, QA Engineer
E. Wolber, QA Inspector

EBASCO Services, Incorporated, (EBASCO)

T. Pederson, Level III, NDE

Nuclear Regulatory Commission (NRC)

J. Hinds, Jr., Senior Resident Inspector
P. Brochman, Resident Inspector
J. Malloy, Resident Inspector

The inspector also contacted and interviewed other licensee and contractor employees.

*Denotes individual attending the final exit interview on July 10, 1986.

Personnel Attending the June 26, 1986 Meeting at the Braidwood Station
C. Polito, System Materials Analysis Manager, CECo
R. Gaitonde, Supervisor, Staff Engineer, CECo
W. Witt, NDE Supervisor, CECo
D. Christiana, Mechanical Engineer, CECo
D. Rupert, Welding Engineer, CECo
R. Schofield, Project Construction Engineer, CECo
D. Zebrauskas, ISI Engineer, CECo
B. Wilson, NDE Level III, CECo
T. Haaker, NDE Level III, CECo
T. Green, NDE Level II, CECo
A. Adamiec, NDE Level II, CECo
D. Chrzanowski, PSI/ISI Coordinator, CECo
M. Sears, PSI/ISI Technical Staff, CECo
K. Franczak, NDE Level II, PTL/CECo
W. Caldwell, ANII, Hartford Steam Boiler Inspection and Insurance Company
E. Sullivan, Materials Engineer, NRC/NRR
G. Johnson, Materials Engineer, NRC/NRR
S. Lee, Materials, NRC/NRR
B. Brown, Sr., Engineer, NDE, EG&G/INEL (NRC Consultant)
K. Ward, Reactor Inspector, NRC/RIII

2. Licensee Action on Previous Inspection Items

(Closed) Unresolved Item (455/85031-01): Data reports for Weld No. 2RC03AD27½J12 did not clearly reflect the extent of the weld joint volume which had been ultrasonically examined. Further review of the licensees' ultrasonic data by the NRC NDE van personnel revealed that the cast stainless steel elbows in the primary piping system were not scheduled for complete ultrasonic examinations.

CECo and NRC Meeting

A meeting was held June 26, 1986, at the Braidwood Station between CECo and the NRC (See Paragraph 1 for attendees) to address the ultrasonic examination of cast stainless steel component welds. There was a brief description of the procedure qualification program for the following items:

- Calibration Blocks
- Mock up
- Transducers
- Equipment
- Owner's Group Samples
- Personnel Training
- Status of Inspection at Byron Unit 2 and Braidwood Unit 1
- Schedule for Remaining PSI

Cast stainless steel elbows were available at the cancelled Marble Hill plant. CECo personnel visited Marble Hill on January 7, 1986, and examined nine statically cast elbows. One 31 inch to 29 inch reducing elbow was selected as having comparable attenuation to that of the Byron/Braidwood castings. This elbow had the greatest variation of attenuation and had an area that had the highest attenuation of all the elbows examined. This elbow was purchased from Marble Hill for processing into calibration standards. Four calibration standard blocks were machined from this elbow; two from the 29 inch diameter end (2.34 inch thickness) which had lower overall attenuation and two from the 31 inch diameter end (2.83 inch thickness) which had higher attenuation. Both axial an circumferential side drilled holes (S.D.H.) and inner diameter notches were machined into each block. The S.D.H.'s were 3/16 inch diameter and were located at 1/4, 1/2 and 3/4T locations. The inner diameter notches were machined to 10%, 25% and 50% through wall depths. The first set of calibration standards (one from the 29 inch end and the other from the 31 inch end) were sent to Krautkramer Branson (KBA) and the second set was shipped to Harrisonics Labs approximately three weeks later.

KBA and Harrisonics Labs were requested to build search units producing optimum results on the 10% and 25% deep inner diameter notches. Available EPRI recommendations on the design of the search units were also supplied to the manufacturers. KBA made a set (consisting of one unit for the axial scan and one for the circumferential scan) of search units for each block. Each search unit consisted of two 1.0" dia X 1.0 MHZ, Alpha series flat-faced transducers mounted on contoured, removable wedges that produce an approximate 40° to 45°, dual, refracted longitudinal wave focused near the block inner diameter surface. Harrisonics Labs optimum search unit design was very similar to KBA's, but had cylindrically focused transducers mounted on wedges that produce an approximate 40°, refracted L-wave.

Using KBA supplied search units, examinations were conducted by CECo on both calibration blocks using several different UT instruments. The UT instruments available were: Nortec 131, Sonic Mark 1, Krautkramer USIP 11 and Panametrics EPOCH 2022. The EPOCH 2022 machine produced the best signal-to-noise ratios (at 0.5 MHZ filter) on the 10% and 25% inner diameter notches. The USIP 11 and Mark 1 were adequate, but not as good as EPOCH 2022. The Nortec 131 was found to be inadequate for angle beam examination. With regard to the search units, several interesting observations were made. The search units optimized for the 29 inch diameter calibration block (lower attenuation) also produced optimum results on the 31 inch diameter calibration block (higher attenuation). The second observation was that despite attenuation differences between the two blocks, approximately the same results were obtained regarding the background noise (10% to 20% screen height at the reference sensitivity) and the signal-to-noise ratio.

Partial examinations were conducted by CECo at Braidwood Unit 2 on 9 welds of loop No. 1 using the EPOCH 2022 and the KBA transducers. These preliminary examinations showed strong, but intermittent and sometimes continuous signals at the inner diameter. These signals, attributed to grain structure and/or inner diameter geometry, were similar to the ones obtained from the 10% inner diameter notch.

Based on this developmental work and the preliminary examination of some welds on Braidwood Unit 2, a procedure was written for the preservice examination of weldments in the cast stainless steel components and fittings at Byron Unit 2 and Braidwood Units 1 and 2. This procedure was used to examine only the cast side(s) of the reactor coolant systems welds. The welds examined were categorized as follows:

- Forged reactor nozzle safe-end - to - cast elbow welds
- Steam generator nozzle - to - cast elbow welds
- Forged pipe - to - cast elbow, pump or valve welds
- Cast elbow - to - cast pump or valve welds

There are approximately 50 welds of these types in each reactor coolant system at Byron Units 1 and 2 and Braidwood Units 1 and 2.

CECo conducted a plant tour for the meeting attendees pointing out welds on an elbow to steam generator nozzle, a pump to elbow, a pump to pipe and a valve to elbow that would be ultrasonically examined. CECo also performed UT on a valve to pipe weld and a pump to pipe weld. These examinations were conducted in accordance with ASME Section XI, 1977 Edition, Summer 1978 Addenda, Paragraph IWA-2240 and CECo Procedure NDT-C-38 Revision 0.

The ultrasonic technicians are trained on calibration blocks and a mock-up of a pipe weld using an EPOCH 2022 instrument and CECo's NDE Procedure NDT-C-38, Revision 0, prior to performing UT on the component welds in the system. The NRC inspector observed some of the training conducted at Byron.

CECo plans to start ultrasonicly examining the welds on Byron Unit 1 during the next outage.

3. Observation of Ultrasonic Examinations (UT)

The NRC inspector observed UT on a forged safe end to cast elbow weld, (Line No. 2RC03AB-27.5," Weld No. J12) and a forged pipe to cast elbow weld (Line No. 2RC03AB-27.5," Weld No. J11). The calibration and the recording was also observed. The NRC inspector also reviewed the program, procedure, data, material and personnel certifications.

Two of CECo's Level III's, an EBASCO Level III and the NRC inspector reviewed several radiographs of welds in which UT indications were observed. The NRC inspectors review of the radiographs and the UT results for these welds, concluded that the welds met applicable ASME Code requirements. The actions taken by the licensee were acceptable.

No violations or deviations were identified.

4. Radiographic Review

The NRC inspector reviewed radiographs and reports of the following welds:

Contractor	Component/System	Shop Weld	Thickness	Date of RT
PDM	Reactor Pool Seams	105M2	3/16"	6/29/79
PDM	Reactor Pool Seams	105M4	3/16"	6/29/79
PDM	Reactor Pool Seams	105M3	3/16"	6/29/79
PDM	Reactor Pool Seams	286M5	3/16"	11/28/78
PDM	Reactor Pool Plug	5	3/16"	6/12/78
PDM	Reactor Pool Seam	12	3/16"	6/12/78
PDM	Reactor Pool Plug	1	3/16"	5/30/78
PDM	Reactor Pool Seam	5M	3/16"	6/28/79
PDM	Reactor Pool Seam	288M3	3/16"	2/15/79
PDM	Reactor Pool Seam	288M1	3/16"	8/24/78
PDM	Reactor Pool Seam	288M2R	3/16"	8/24/78
PDM	Reactor Pool Seam	288M2L	3/16"	8/24/78
PDM	Reactor Pool Seam	55	3/16"	5/17/78
PDM	Reactor Pool Seam	56	3/16"	5/17/78
PDM	Reactor Pool Seam	54	3/16"	5/17/78
PDM	Reactor Pool Seam	53	3/16"	5/17/78
PDM	Reactor Pool Seam	45	3/16"	5/17/78
PDM	FW-76-1 Pipe	W-2	2.75"	6/30/80
PDM	FW-76-1 Pipe	3	2.75"	6/30/80
PDM	FW-76-1 Pipe	4	2.75"	6/30/80
PDM	FW-76-1 Pipe	5	2.75"	6/30/80
PDM	FW-76-1 Pipe	6	2.75"	6/30/80
PDM	FW-76-1 Pipe	7	2.75"	6/30/80
Taylor Forge	L/R 90° ELL	3	0.480"	1/2/75
Taylor Forge	L/R 90° ELL	1	0.480"	8/26/77
Taylor Forge	L/R 90° ELL	2	0.480"	8/26/77
Taylor Forge	L/R 90° ELL	4	0.480"	8/26/77
Taylor Forge	L/R 90° ELL	5	0.480"	8/26/77
Taylor Forge	L/R 90° ELL	6	0.480"	8/26/77

Taylor Forge	L/R 90° ELL	8	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-6-40	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-6-41	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-6-42	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-6-44	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-6-45	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-6-46	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-7-49	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-7-55	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-8-57	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-8-59	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-8-60	0.450"	9/9/77
Taylor Forge	L/R 90° ELL	12-8-61	0.450"	9/9/77

Graver Tank	Spray Additive Tank	1A1-1	1/2"	7/20/77
Graver Tank	Spray Additive Tank	2A1-1	1/2"	7/20/77

Southwest Fab.	FW-71-6	W-2	0.438"	12/17/79
Southwest Fab.	FW-71-6	W-3	0.438"	12/17/79
Southwest Fab.	FW-71-6	W-4	0.438"	12/17/79
Southwest Fab.	FW-71-6	W-5	0.438"	12/17/79
Southwest Fab.	SI-34-6	W-2	0.906"	6/17/80
Southwest Fab.	SI-34-6	W-3	0.906"	6/17/80
Southwest Fab.	SI-34-6	W-4	0.906"	6/17/80
Southwest Fab.	SI-34-6	W-7	0.906"	6/17/80
Southwest Fab.	FW-74-7	W-2	0.300"	6/18/80
Southwest Fab.	FW-74-7	W-3	0.300"	6/18/80
Southwest Fab.	FW-74-7	W-4	0.300"	6/18/80
Southwest Fab.	FW-74-7	W-5	0.300"	6/18/80

PTL	S-CV-100-219B	FW-3057	0.344"	12/19/82
PTL	S-CV-100-219B	FW-3058	0.344"	1/30/84
PTL	S-CV-100-219B	FW-3059	0.344"	7/29/83
PTL	S-CV-100-219B	FW-3060	0.344"	7/29/83
PTL	S-CV-100-229	FW-3185	0.344"	11/4/82
PTL	S-CV-100-229	FW-3183	0.344"	1/31/83
PTL	S-CV-100-229	FW-3183A	0.344"	2/11/83
PTL	S-CV-100-229	FW-3184	0.344"	4/16/82
PTL	FW-24	FW-67	1.812"	9/2/81
PTL	FW-24	FW-174	1.812"	10/1/80
PTL	FW-24	FW-172	1.812"	10/3/80
PTL	FW-24	FW-68	1.812"	10/27/81
PTL	FW-24	FW-66	1.812"	8/31/81
PTL	FW-24	FW-65	1.812"	9/9/81
PTL	CS-15	FW-85	0.345"	9/29/81
PTL	CS-15	FW-83	0.345"	4/29/83
PTL	CS-15	FW-248	0.365"	7/18/81
PTL	CS-15	FW-86	0.365"	8/11/81
PTL	CS-15-7	FW-247	0.365"	11/24/81
PTL	CS-15-8	FW-424	0.345"	2/16/83
PTL	CS-15-9	FW-425	0.345"	11/10/81

PTL	AF-24	FW-249	0.438"	1/8/82
PTL	AF-23	FW-260	0.438"	2/8/82
PTL	AF-21	FW-273	0.438"	10/30/81
PTL	AF-22	FW-311	0.438"	12/10/81
PTL	AF-23	FW-255	0.438"	2/2/82

No violations or deviations were identified.

5. Exit Meeting

The inspector met with site representative (denoted in Persons Contacted paragraph) at the conclusion of the inspection. The inspector summarized the scope and findings of the inspection noted in this report. The inspector also discussed the likely informational content of the inspector report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any such documents/ processes as proprietary.