U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-249/88010(DRS)

Docket No. 50-249 License No. DPR-25

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

Facility Name: Dresden Station, Unit 3

Inspection At: Dresden Site, Morris, Illinois

Inspection Conducted: April 4-7, May 3-5, 16-18, and June 13-14, 21-22, 1988

Inspector: for J. F. Schapker — Date: 6/28/88

Approved By: D. H. Danielson, Chief, Materials and Processes Section — Date: 6/28/88

Inspection Summary

Inspection on April 4-7, May 3-5, 16-18, and June 13-14, 21-22, 1988 (Report No. 50-249/88010(DRS))

Areas Inspected: Routine unannounced inspection of inservice inspection (ISI) activities including review of program (73051), procedures (73052), observation of work and work activities (73053), of data review and evaluation (73055); of the inspection for verification of Mark 1 BWR Drywell Vacuum Breaker Modifications (37828)(TI 2515/96); of IE Information Notices (92704); of plant modifications (37702); and of inspection of the Drywell containment for degradation (GL-87-05) (92703).

Results:

- ISI activities were accomplished within the guidelines of ASME Section XI and Generic Letter (GL) 84-11 requirements. The licensee has received GL 88-01 and is in process of revising the ISI program to implement the augmented requirements within.
- Plant modification welding and nondestructive examinations were performed to the applicable code requirements. Implementation of modifications were adequately controlled by QA, QC requirements.
- Licensee's actions taken on Generic Letters and Information notice was adequate to assure safety was not compromised.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

*E. Eenigenburg, Station Manager
E. Armstrong, Regulatory Assurance Supervisor
C. Schroeder, Services superintendent
*R. Geier, QC Supervisor
*R. Hylka, QC ISI Coordinator
*K. Peterman, Regulatory Assurance Supervisor
*J. Achterberg, Technical Staff Supervisor
*J. Williams, Regulatory Assurance
*D. Van Pelt, Assistant Superintendent Maintenance
*J. WuJciga, Production superintendent
*J. Brunner, Assistant superintendent Technical Services
R. Falbo, Regulatory Assurance
M. Harbaczewski, Technical Staff ISI
R. Dyer, Technical Staff Assistant Modification Group Leader
L. Luna, Technical Staff Engineer Modification Group
K. Knudson, Technical Staff Engineer Modification Group
D. Fischer, Technical Staff Engineer Modification Group

General Electric Co. (GE)

B. Newell, Level III
T. Kimball, Level II
V. Krueger, Level II
P. Wright, Level II
T. Bordenet, Level I

Hartford Steam Boiler Inspection (HSB)

K. Kilmer, ANII

U.S. Nuclear Regulatory Commission

S. Dupont, Senior Resident Inspector
P. Kaufman, Senior Resident Inspector

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

*Denoted those present at the final exit meeting June 22, 1988.

2. Licensee Action Taken on Information Notices

(Closed) Information Notice 88-03 (88900-01) Cracks in Shroud Support Access Hole Cover Welds.

Background

Jet pump BWRs are designed with access holes in the shroud support plate which is located at the bottom of the annulus between the core shroud and the reactor vessel wall. Each reactor vessel has two such holes which are located 180 degrees apart. These holes are used for access during construction and are subsequently closed by welding a plate over the hole. The covers and shroud support ledge are Inconel Alloy 600 material. The connecting weld material is also Inconel 600 (Alloy 182 or 82).

The high residual stresses resulting from welding, along with a possible crevice geometry of the weld, when combined with less than ideal water quality, present a condition conducive to intergranular stress corrosion cracking (ISGCC). This has been recognized by General Electric and, as a result, they have developed a remotely operated ultrasonic testing capability for detecting cracks in the cover plate welds. The first use of this custom ultrasonic testing fixture was at Peach Bottom Unit 3.

On January 21, 1988, intermittent short cracks were found in the weld heat-affected zone around the entire circumference of the covers at Peach Bottom Unit 3. It is estimated that cracking exists over 50% to 60% of the circumference with cusps as deep as 70% through the wall. It is believed that cover plate welds have not been inspected previously on any other BWR. It is possible that the cracking is generic and may, therefore, affect all BWRs with jet pumps.

Licensee Action

The licensee employed the services of GE to examine the welds utilizing ultrasonic examination of the cover plate welds.

During the examination of the cover plate welds no indications associated with IGSCC were recorded with the "Smart UT" (SUT) system utilizing 45° shear wave and 55° refracted longwave (RL) search units.

The "Smart UT" system did record non-relevant indications, root geometry and shear redirect with the 45° shear wave search unit. With the 55° RL search unit the SUT system recorded root geometry. The examination was performed from the access cover side of the weld, inspecting both the weld material and heat affected zone. The examination was conducted remotely with a specialized access hole cover scanning fixture designed by GE utilizing the immersion technique.

The UT examination provides adequate assurance that the access cover plate welds and heat affected zones have not degraded and will not compromised the safety of the operation of the reactor.

3. Inspection For Verification of Mark I BWR Drywell Vacuum Breaker Modifications (Closed) SIMS MPA-D20 (TI 2515/96)

Objective

To inspect those plants that have modified their drywell vacuum breakers in response to NRR Generic Letter 83-08, and to allow close out of this action item, under Multi-Plant Action Item D-20.

Background

In December 1979, General Electric issued SIL No. 321 informing customers of unanticipated cycling and damage to drywell vacuum breakers during LOCA tests in a prototype Mark I containment. To assure that drywell vacuum breakers would be capable of withstanding chugging and condensation oscillation loads, the staff issued Generic Letter 83-08 requesting licensees of Mark I containments to perform plant-unique calculations to determine the structural adequacy of the drywell vacuum breakers. The staff has received responses to the Generic Letter and has issued Safety Evaluations. Some licensees, in their response, determined that vacuum breaker modifications were required, whereas others determined that no modifications were needed. The need for modifications is identified in the Safety Evaluation Report.

Inspection

The NRC inspector reviewed the licensee's Technical Evaluation Report for the structural evaluation of the Vacuum Breakers and the Safety Evaluation by NRR.

In each of the Dresden 2 and 3 Mark I Containments, there are twelve 18" external type vacuum breakers made by Atwood - Morrill mounted on six exterior headers connecting the suppression chamber and the vent line exterior of the wetwell. Loadings on Mark I structures and vacuum breakers are based on the General Electric Company Report, NEDO-21888, "Mark I Containment program Load Definition Report," Revision 2, dated November, 1981. For vacuum breakers, the loadings included are gravity, seismic, and hydrodynamic loads. The hydrodynamic forcing functions were developed by Continuum Dynamics, Inc. by using a dynamic model of a Mark I pressure suppression system and the full scale test facility data. The system model was capable of predicting pressure transients at specific locations in the vent system. Loading across the vacuum breaker disc caused by pressure differentials based on test data was thus quantified as a function of time. This issue was reviewed and approved by NRC on December 24, 1984. Loadings were combined according to the FSAR commitments.

To determine the structural integrity of the vacuum breakers, results from a finite element model and ANSYS program analyses were compared with design limits specified in the ASME Boiler and Pressure Vessel Code, Section III, Revision I, Subsection NC, 1977 Edition and Addenda up to

Summer 1977. It was found that the hydrodynamic chugging force in Dresden 2 and 3 will not significantly increase the impact velocity on vacuum breakers to cause any additional loading. Since the original design margin does not need improvement, the licensee decided that no modifications were needed on the construction of its vacuum breakers. The licensee, however, did replace the original aluminum cast discs with aluminum plate material for better ductility.

The NRC inspector reviewed the licensee's design modification records pertaining to the replacement of the cast aluminum disc to wrought aluminum discs with stainless steel post.

The SER review by NRR determined that the structural analysis indicated the existing vacuum breaker design was acceptable and no additional modifications were required. Review of vacuum breaker disc modification documentation disclosed completion of the disc replacement had been made with material as required by design change modification.

No violations or deviations were identified.

4. Licensee Action Taken on Generic Letter 87-05 Inspection of Unit 3 Drywell Containment

Background

Significant corrosion was found to have thinned the drywell skin at Oyster Creek Station in November 1986 in a location adjacent to the sand cushion. The cushion is located just below the torus vent lines on the outside of the drywell skin. The cushion's purpose is to provide a transition from the rigid support at the bottom of the drywell to allow movement of the skin.

Licensee Action

In the Summer of 1987, the licensee inspected the drains to the sand cushions and determined that they were plugged. The plugged lines were cleared and the water from the drains were determined to be mildly corrosive.

During this outage the licensee initiated an inspection program to measure the thickness of the drywell skin in the sand cushion area. Twenty two core drillings in the concrete surface to the drywell liner was made. The core drillings were made at the top and bottom sections of the sand pocket area (11 at the top and 11 at the bottom). The azimuth sections were selected based on sand pocket location and accessibility. Ultrasonic examinations (UT) of the drywell wall was performed. The as designed nominal wall thickness is 1.0625." The thickness measurements were as follows:

Location (Azimuth)	Identification Point	Report #	Measured Thickness
Sector No. 1: x=5'	22.5.1.1A*	CPD-109	1.10"
Sector No. 1: x=5'	22.5.1.1B**	CPD-110	1.14"
Sector No. 1: x=6'	22.5.1.2A	CPD-110	1.14"
Sector No. 1: x=6'	22.5.1.2B	CPD-112	1.10"
Sector No. 2: x=7'	112.5.1.1A	CPD-107	1.12"
Sector No. 2: x=7'	112.5.1.1B	CPD-119	1.12"
Sector No. 2: x=5.5'	112.5.1.2A	CPD-108	1.10"
Sector No. 2: x=5.5'	112.5.1.2B	CPD-119	1.08"
Sector No. 3: x=11'	157.5.1.1A	CPD-104	1.14"
Sector No. 3: x=11'	157.5.1.1B	CPD-105	1.14"
Sector No. 3: x=9'	157.5.1.2A	CPD-102	1.14"
Sector No. 3: x=9'	157.5.1.2B	CPD-103	1.12"
Sector No. 4: x=13.5'	202.5.1.1A	CPD-100	1.08"
Sector No. 4: x=13.5'	202.5.1.1B	CPD-101	1.08"
Sector No. 5: x=12'	292.5.1.1A	CPD-114	1.18"
Sector No. 5: x=12'	292.5.1.1B	CPD-117	1.12"
Sector No. 5: x=7'	292.5.1.2A	CPD-115	1.12"
Sector No. 5: x=7'	292.5.1.2B	CPD-116	1.26"
Sector No. 6: x=9'	337.5.1.1A	CPD-118	1.20"
Sector No. 6: x=9'	337.5.1.1B	CPD-120	1.08"
Sector No. 11: x=11	337.5.1.2A	CPD-106	1.12"
Sector No. 11: x=11	337.5.1.2B	CPD-113	1.24"

*A = top section of sand pocket
**B = bottom section of sand pocket

See Attachment "A" for sketch of azimuth locations.

The ultrasonic examinations provides additional assurance that the drywell wall has not degraded due to the trapped water discovered when the plugged drain lines were cleared. During the core drilling of the concrete floor to gain access to the drywell wall in the sand pocket areas, the licensee encountered water in the core holes. The licensee took samples of the core hole water and determined the source was hydrolyzing which was performed prior to the core drilling. To assure all water was removed from this process the licensee drilled a well hole in the center of the containment floor to the Drywell wall interface. However no water was recovered at this point. The licensee's investigation as to the source of the water included inspection of the mastic seal at the concrete - drywell wall interface and the concrete floor within the drywell. The mastic seal appeared to be intact however cracks in the concrete floor of the drywell are a likely source for the water from hydrolyzing.

The licensee sealed the inspection holes and will perform further inspections to assure the drywell wall does not degrade and attempt to find the source of the leakage into the sand pocket area and initiate corrective action.

The licensee has established that the drywell wall does not exhibit degradation from the water which was trapped in the sand pocket and has initiated a corrective action program which will assure the safety of the containment is not compromised.

5. Inservice Inspection (ISI) Unit 3

a. General

This was the third outage of the second period in the second ten year plan. The licensee contracted with General Electric Corporation (GE) to perform ultrasonic (UT), magnetic particle (MT), liquid penetrant (PT), and visual examinations (VT). Examinations were performed in accordance with ASME Section XI, 1977 Edition, Summer 1979 addenda.

The NRC inspector reviewed the ISI inspection second ten year plan, Revision 1, dated, December 1982, ASME Section XI code relief request CR-1 through CR9 and verified the licensee successfully demonstrated the UT calibration blocks attenuation and velocities are representative of the reactor vessel base material as required by relief request CR-8.

b. ISI Procedure Review

The NRC inspector reviewed the following NDE procedures.

- CECo, Nondestructive Testing (Inservice Inspection) DAP 11-8, Revision 3.
- CECo, "Preservice and Inservice Ultrasonic Inspection of Similar and Dissimilar Metal Pipe Welds at Nuclear Station," NDT-C-2, Revision 15.
- GE "Qualification and Certification of Nondestructive Testing Personnel," QC-2 Revision 4.
- GE "Visual Acuity Testing," QC-4 Revision 1.
- CECo, "Ultrasonic Inspection of the Vessel Nozzle Inner Radii at Nuclear Stations," NDT-C-10, Revision 10.
- CECo, "Ultrasonic Inspection of Flange Ligaments Between Threaded Bolt Holes," NDT-C-11, Revision 11.
- CECo, "Ultrasonic Examination of Reactor Vessel Welds to NRC Reg. Guide 1.150 for Boiling Water Reactors," NDT-C-30-79, Revision 0.
- CECo, "Beam spread and Refracted Angle Determination to NRC Reg. Guide 1.150 for Boiling Water Reactors," NDT-C-31-79, Revision 0.

- CECo, "Nonaqueous Red Dye Liquid Penetrant Examination for Section XI Class IWB and IWC Components for Nuclear Stations," NDT-D-2, Revision 4.

- CECo, "Visual Examination - Welds, Pressure Retaining Bolting, and Component Internals," VT-1-1, Revision 2.

- CECo, "Visual Examination - System Hydrostatic and Leak Tests," VT-2-1, Revision 1.

- CECo, "Visual Examination - Component Supports," VT-3-1, Revision 1.

- CECo, "Magnetic Particle Examination for A.S.M.E. Section XI Class IWB and IWC Components for Nuclear Stations," NDT-B-1, Revision 2.

No violations or deviations were identified.

c. Review of ISI Data, Material, Equipment and NDE Personnel Certifications

The NRC inspector reviewed the following documents and determined that the applicable QA/QC requirements were met:

- ISI Data Reports.

- Ultrasonic Instruments, Transducers, and Couplant Certifications.

- Liquid Penetrant, Cleaner and Developer Certifications.

- Magnetic Particle materials and Equipment.

- NDE personnel certifications compliance to SNT-TC 1A requirements.

d. Observations of Work and Work Activities (ISI)

The NRC inspector observed nondestructive examinations in progress on the following components and piping.

- Ultrasonic examination of the Reactor Vessel Closure Head circumferential welds D, E, and meridional weld No. 5.

- Magnetic particle examination of Reactor Vessel Head - Flange to head weld. (D) Ultrasonic examination of Core Spray line No. 1403, piping welds Nos. 10-10, 10-K11, 10-K12.

- Visual examination of various hangers and supports for damage, wear, proper settings, and weld reinforcement.

The NRC inspector also observed calibrations of ultrasonic equipment prior to and after the examinations referenced above, discussed NDE procedures and examination findings with the Level II and III examination personnel. Examinations performed by the cognizant personnel were adequate in meeting the safety objectives of the ASME Section XI requirements.

e. Augmented Inspection of Intergranular Stress Corrosion Cracking (IGSCC) Susceptible Piping (GL 84-11)

During the Fall 1985/Spring 1986 Recirculation Pipe Replacement outage most of the IGSCC susceptible piping was replaced using IGSCC resistant material. There is some remaining Class 1 stainless steel piping that is susceptible to IGSCC. There are a total of fifty (50) welds in this category to which twenty-eight (28) were stress improved.

A total of twelve (12) IGSCC susceptible piping welds were ultrasonicly examined this outage in accordance with the sampling plan which follows the requirements of Generic Letter 84-11.

No IGSCC indications were found in the examination for the twelve piping welds. Examination services were provided by GE using approved Commonwealth Edison Co. (CECo) procedures. CECo NDE personnel were utilized for review and ultimate resolution of the examination results. CECo. and GE IGSCC UT examination personnel were qualified at the EPRI NDE Center after September of 1985.

The NRC inspector reviewed examination results and concurred with the UT inspectors evaluations.

6. Feedwater Regulator Valve Modification

a. Background

Feedwater transients occurred at the Dresden Station Unit 3 on July 11, and August 7, 1987. Based on results from an investigative team report, the following modifications were initiated for the feedwater system to correct the deficiencies:

(1) Replace the 3A feedwater regulating valve with a drag valve.

(2) The actuator for the 3A feedwater regulating valve was to be changed to an electro-hydraulic actuator.

(3) The internals for the 3B feedwater regulating valve were to be replaced with a new type of internals that will provide more stable valve operation.

(4) The feedwater low flow line was increased from six inches diameter to ten inches.

(5) The set points of the switches that control the opening of the reactor feed pump minimum flow valves were to be raised.

b. Review of Records, Reports and Certification

The NRC inspector reviewed the following documentation items and determined that the applicable requirements of QA/QC commitments have been met:

- Fabrication/Installation Traveler and Drawings.
- Weld Data Sheet.
- Stress Relief Temperature Recording Charts
- Welder Qualification Records.
- Piping and Weld Material Certifications.
- NDE Personnel Certifications.
- NDE Procedures.
- NDE Reports.

No violations or deviations were identified.

c. Observation of Work Activities

The NRC inspector observed the fit-up/welding of piping, valves, and hangers. Inspections of welder certifications, use of certified weld material, weld procedures, stress relief and visual examination of welding in progress were completed throughout the modification. The following final radiographs of the pipe to pipe and pipe to valve welds were reviewed:

Weld Map	Weld No.	Pipe Diameter
M381-1-2	B16	10"
M381-1-2	B9	10"
M381-1-2	B6	10"
M381-1-1	B9	18"
M381-1-1	B10	18"
M381-1-1	B11	18"
M381-1-1	B6	18"
M381-1-1	B8	18"
M381-1-1	B4	24"
M381-1-1	B5	24"

No violation or deviations were observed.

7. Standby Liquid Control Modification

a. Background

This modifications was implemented to allow simultaneous operation of both the Standby Liquid Control system (SLCS) injection pumps, and increase the minimum sodium pentaborate solution concentration to 14 weight percent. This modification meets the requirements of 10 CFR 50.62 which states in Paragraph (C)(4) "Each boiling water reactor must have a SLCS with a minimum flow capacity and boron content equivalent in control capacity to 86 gallons per minute of 13 weight percent sodium pentaborate solution."

b. Review Records, Reports, Procedures, and Drawings

The NRC inspector reviewed the following documentation/records, and determined the applicable code and NRC regulatory commitments were met:

- Modification package M12-2(3)-84-119
- Design Specification K-4080
- Work Request D38684
- Drawings: M384 Revision H
  M414 Revision H
  M364 Revision X
  M1149 Revision A
- Weld procedure 8-8-D Revision 3 (QW 482)
- Weld material ER 308/308L, Heats 42554, 09735, 73797
- Visual inspection procedure VT-1-1 Revision 2
- 10 CFR 50.59 review

c. Observation of Work Activities

The NRC inspector observed the fit-up, welding of the pipe to pipe and pipe to standby liquid control tank welds. Inspections included review of welder certifications, use of certified weld materials, weld procedures, drawing dimensions, and visual inspections of ID and OD of welds.

The standby liquid control modification was adequate to assure the safety objectives as described in 10 CFR 50.62 have been complied with.

8. Exit Meeting

The NRC Inspector met with the licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on June 22, 1988. The inspector summarized the purpose and findings of the inspection. The licensee representatives acknowledged this information. The inspector also discussed the likely informational content of the inspection report with regards to documents or processes reviewed during the inspection. the licensee representatives did not identify any such documents/processes as proprietary.

THICKNESS MEASUREMENT