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December 14, 1992

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTN: Document Control Desk

SUBJECT: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
Commonwealth Edison RWCU Outboard Piping Inspection Plan for Dresden and Quad Cities Stations
NRC Docket Nos. 50-237/249 and 50-254/265

REFERENCES: (1) J.L. Schrage to T.E. Murley letter dated December 3, 1992.

(2) J.L. Schrage to T.E. Murley letter dated December 4, 1992.

(3) Teleconference between CECo (J. Schrage et al) and NRR (B. Siegel et al) on December 11, 1992.

Dr. Murley,

In References (1) and (2), Commonwealth Edison (CECo) presented the basis for a request to rescind CECo's commitment to replace the Reactor Water Cleanup (RWCU) system outboard piping at Dresden and Quad Cities Stations. This commitment was made in response to Generic Letter 88-01, "NRC Position on Integranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping". The basis was discussed with the NRC during the Reference (3) teleconference. During that teleconference, CECo committed to revise the proposed RWCU Pipe Inspection Plan to incorporate NRC comments.

The purpose of this letter is to document the proposed revision to the CECo RWCU Pipe Inspection Plan which was submitted in References (1) and (2). The revised plan is described in the Attachment to this letter. CECo requests approval of this plan by December 18, 1992, as discussed during the Reference (3) teleconference.

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If there are any questions or comments, please direct them to John L. Schrage at 708-515-7283.

Sincerely,

John L. Schrage
Nuclear Licensing Administrator

JLS/lak

Attachment

cc: A. Bert Davis, Regional Administrator-RIII
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ZNLD/2275-4

ATTACHMENT
RWCU Outboard Piping Inspection Plan for Dresden and Quad Cities Station

OVERVIEW

The Commonwealth Edison (CECo) RWCU Outboard Piping Inspection Plan described in this attachment was developed to address the RWCU outboard piping at Dresden and Quad Cities Stations for Generic Letter 88-01 (and Supplement 1). The proposed inspection plan is structured to: 1) ensure that the NRC is informed of outboard RWCU weld inspection results as well as long term actions and plans for the outboard piping; 2) ensure that any pipe replacement activities are based upon inspection results; and, 3) minimize outage extensions by establishing a fixed inspection sample size. The plan consists of inspections of supply side and return side welds on each unit at Dresden and Quad Cities Stations during the upcoming refuel outages. Based upon the results of these inspections, CECo will utilize the approach outlined in this attachment, and shown on the attached flowchart, to determine the appropriate action. The plan has currently been developed for three cycles of inspections for each unit, at which time CECo will discuss future inspection, repair, and/or replacement activities with the NRC.

RWCU SYSTEM ISOLATION CAPABILITY

In response to Generic Letter 89-10 Supplement 3, CECo has implemented upgrades/enhancements to the RWCU isolation valves at each station during recent outages (refueling and forced). These upgrades/enhancements primarily included the adjustment of torque switch settings and the bypassing of close torque switches (to 95% of valve travel). The upgrades /enhancements were implemented to ensure that the valves would produce sufficient thrust to perform their design basis function, which is the isolation of containment in the event of a pipe break downstream of the valves. As a result of these efforts, CECo has determined that only one isolation valve at each station is considered "deficient" with respect to Generic Letter 89-10 Supplement 3 (Quad Cities Unit 1 outboard isolation valve, Dresden Unit 2 inboard isolation valve). Additionally, CECo plans to implement long-term upgrades/enhancements on the isolation valves during the upcoming refuel outage for each unit (see following schedule). These upgrades/enhancements, which primarily involve hardware modifications (ie: valve replacements, installation of larger valve actuators, gear replacements in existing actuators, installation of larger power cables), will increase design margins and ensure isolation capability (for the two previously discussed valves).

Dresden Unit 2: D2R13 refuel outage (starting January 1993)

Dresden Unit 3: D3R13 refuel outage (starting January 1994)

Quad Cities Unit 1: Q1R12 refuel outage (currently in progress - ending December 1992)

Quad Cities Unit 2: Q2R12 refuel outage (starting March 1993)

INITIAL RWCU OUTBOARD PIPING INSPECTIONS

During the next refuel outage on each unit at Dresden and Quad Cities Stations (beginning with D2R13 - January 1993 and Q2R12 - March 1993), Commonwealth Edison (CECo) will perform circumferential weld inspections (ultrasonic examinations) on eight welds. The selection of the initial eight welds was based upon the potential susceptibility of the outboard RWCU piping to IGSCC and the accessibility of the individual welds (based upon ease of inspection and estimated radiation exposure). The susceptibility of the various sections of outboard piping have been qualitatively reviewed taking into account operating temperature and conductivity considerations.

The use of operating temperature and conductivity as criteria to evaluate potential IGSCC susceptibility is based upon the direct relationship between IGSCC and both operating temperature and conductivity. The RWCU systems at Dresden and Quad Cities stations exhibit significant differences in both temperature and conductivity for various sections of RWCU piping. Since technical data/information indicates that austenitic stainless steel piping (type 304) is more susceptible to IGSCC at temperatures greater than 300°F (Reference (a)), CECo has determined that welds from the supply piping (between the outboard isolation valves and regenerative heat exchangers) and return piping (downstream of the regenerative heat exchangers) will be selected for inspection. The majority of the welds (six of the eight selected welds) will be selected from the supply side piping, since that piping is exposed to the highest operating temperature (in excess of 500°F) and contains water with the highest conductivity. These six welds represent approximately 10% of the supply side welds with temperatures in excess of 300°F (59 supply side

welds at Dresden Station and 62 supply side welds at Quad Cities Station). The two remaining welds for inspection will be selected from the return piping located downstream of the regenerative heat exchangers. This section of return side piping has an operating temperature of approximately 435°F; however, the conductivity is lower than that experienced by the supply side piping. The number of return side welds selected for inspection is also based upon the relative differences in differential pressure conditions between return and supply piping, if a leak were to occur. On the return side piping (as opposed to supply side piping), the differential pressure conditions for the isolation valves would be reduced by resistance created by system components.

PROPOSED ACTIONS: INDICATIONS DURING INITIAL WELD INSPECTIONS

Initial Evaluation and CECo Actions

If the results of the initial weld inspections on a particular unit indicate the presence of cracks, CECo will implement the following: 1) repair the indications/replace localized sections of piping during the current outage; or 2) seek NRC concurrence for one cycle of continued operation without repair. The justification for continued operation without repair will be based upon: isolation capability; crack growth projections, and, interim compensatory measures (e.g., augmented temperature monitoring, periodic walkdowns, etc.). The crack growth projections will be based upon the NRC approved crack growth rate as described in GL 88-01, and modified in accordance with the Reference (b) teleconference (see "Crack Growth Determination" section of this attachment).

If the NRC does not concur with an additional cycle of operation without repair, CECo will repair the indications or replace localized sections of piping during the current outage. However, if the NRC concurs with the request for an additional cycle of operation without repair/localized replacement, CECo will reinspect those welds during the next (second) refuel outage and notify the NRC of the results as well as the proposed actions (see "***Actions During Future Outages***" in this section of the Attachment).

As a secondary evaluation during the initial inspection period, if the total number of supply side indications exceed 40% of the number of inspected supply side welds, CECo will replace the supply side piping (through the regenerative heat exchangers) during the following refuel outage at Quad Cities Station, given procurement constraints; and during the following two refuel outages at Dresden Station.

The two refuel outage schedule at Dresden Station is based upon current plans for the potential implementation of the activities associated with the RWCU outboard supply piping replacement. The RWCU outboard supply piping replacement would modify the system from a two-train design to a single-train design. Since the outboard supply line for Dresden Station is configured with a common section of piping through a pipeway prior to entering the two heat exchanger rooms (each containing one train of the two-train system), replacement of the outboard piping during a single outage would necessitate an unnecessary outage extension. Current plans during the first outage would be to: 1) replace the common supply side piping; 2) replace the piping associated with Auxiliary Cleanup Pump; and 3) physically isolate one train of the system (in preparation for replacement). The planned replacement and isolation activities encompass approximately 59% of the supply side welds with operating temperatures greater than 300°F. During the following operating cycle, replacement activities on the isolated train could be performed, while the other train remains in service. During the second outage, the replaced train (with the non-susceptible supply piping) will be permanently connected to the common supply piping to complete the single-train design. At this point, the remaining train (with susceptible piping) will be physically isolated to support removal at a later time. At Quad Cities Station, the RWCU outboard supply piping enters a single heat exchanger room (which contains both trains) when leaving containment, resulting in a shorter length of supply piping. This configuration, coupled with a smaller pipe size at Quad Cities Station, allows for replacement of the supply side piping in a single refuel outage.

Actions During Future Outages

Following the initial outage in which crack indications are found, CECo will implement weld inspections during the two subsequent refuel outages on each applicable unit. For the supply side piping, the inspections will be performed on 6 supply side welds which are exposed to temperatures in excess of 300°F. This number of welds will consist of: reinspection of welds with indications identified during the previous outage(s) which were not repaired; and, new supply side welds. For the return side piping, the inspections will be performed on two times the number of new indications identified during the previous outage, plus two. This total will include reinspection of previous indications which were not repaired.

If indications on new welds are found during the subsequent inspections, CECo will implement the following: 1) repair the indications/replace localized sections of piping during the current outage; or 2) provide justification to the NRC for an additional cycle of operation without repair (utilizing the same process employed for the initial inspections). Those new indications found during the second refuel outage which are not repaired will be inspected during the third refuel outage.

Based upon the results of the inspections for the previously unrepaired welds, CECo will implement the following: 1) repair the indications/replace localized sections of piping during the current outage; or 2) provide justification to the NRC for an additional cycle of operation without repair.

If, during the subsequent weld inspections, the total number of supply side indications exceeds 40% of the total number of inspected supply side welds, CECo will replace the supply side piping (through the regenerative heat exchangers) during the following refuel outage, given procurement constraints (note: Dresden units will require two refuel outages as indicated previously). If the total number of return side indications exceed 40% of the total number of return side welds (with a minimum sample size of 8 welds), CECo will replace the return side piping during the following refuel outage.

Final Resolution

After three cycles of inspections (initial inspection and two cycles of subsequent inspections), CECo will discuss the results of the RWCU outboard piping weld inspections with the NRC in order to determine future inspection, repair, and/or replacement activities.

PROPOSED ACTIONS: NO INDICATIONS DURING INITIAL WELD INSPECTIONS

Initial Evaluation and CECo Actions

If the results of the initial weld inspections on a particular unit do not indicate the presence of any cracks, CECo will implement weld inspections, with a smaller inspection sample, during the next refuel outage (second refuel outage) on the applicable unit. The welds will be chosen from the original sample of inspected welds.

Actions During Future Outages

CECo will inspect two supply side welds and one return side weld on the applicable unit during the second refuel outage. If the results do not indicate the presence of any cracks, CECo will inspect the same sample size (two supply side welds and one return side weld) during the third refuel outage. The welds will once again be selected from the original (initial) sample of inspected welds (rotating basis selection process). If the inspections during the second refuel outage indicate the presence of cracks, CECo will implement the previously described actions for new indications found during future outages (see previous section of this attachment). The implementation of these previously described actions will result in a larger sample inspection size during the third refuel outage.

Final Resolution

After three cycles of inspections (initial inspection and two cycles of subsequent inspections), CECo will discuss future inspection, repair, and/or replacement activities with the NRC.

CRACK GROWTH DETERMINATION

If IGSCC indications are discovered during ultrasonic examinations of the initial sample, CECo will perform crack growth calculations to determine the feasibility of one cycle of operation without repair. CECo will use the NRC approved crack growth rate (described in GL 88-01) to perform these calculations. The crack size acceptance criteria will be based on modified ASME Section XI, IWB-3640 rules (as discussed during the Reference (b) teleconference).

The acceptance criteria for flaw size will be based on ASME Section XI, IWB-3640. The Code and non-Code class stainless steel welds at Dresden and Quad Cities Stations were fabricated using gas tungsten arc welding (GTAW) for the root and second layer, a consumable Grinnell insert as the first layer weld filler, and SMAW for the fill passes. As such, Table IWB-3641-5 of ASME Section XI (which provides allowable end-of-evaluation period flaw depth to thickness ratio of circumferential flaws in shielded metal arc welding (SMAW) welds) will be used for acceptance criteria. However, during the Reference (b) teleconference, the NRC indicated that CECo would not be required to include seismic stresses, and could increase the cut-off points for the allowable flaw depth to thickness ratio from 60% to 75%.

REFERENCES

(a) Tsuruta, T. and Okamoto, S., Stress Corrosion Cracking of Sensitized Austenitic Stainless Steels in High Temperature Water, Corrosion, June 1992.

(b) Teleconference between CECo (J. Schrage et al) and NRR (B. Siegel et al) on December 11, 1992

Commonwealth Edison
Outboard RWCU Pipe Inspection Plan

Next Outage

Inspect 6 supply side piping welds and 2 return side piping welds (which are >300 degree F) on each unit at Dresden and Quad Cities Stations.

No indications.

Indications on either supply side or return side.

Submit results to NRC with justification for one cycle of operation without repair. Justification will be based upon isolation capability, crack growth projections, and interim compensatory measures. If NRC concurrence is obtained, CECo will reinspect welds during next refuel outage and notify the NRC of the results and proposed actions (see below).

Concurrence

No concurrence

Repair weld or replace applicable localized section of piping during current outage.

Return Side

Supply Side

Indications on > 40% of welds inspected (on supply side piping)?

Yes

No

Future Outages

A

Initiate ongoing inspections of supply and return side piping (2 supply side welds and 1 return side weld). Inspection sample may be chosen from original welds on a rotating basis. After third outage of inspections, CECo will discuss future inspections with the NRC.

Inspect 6 supply side welds. The supply side total would include: 1) reinspection of supply side welds (with indications) which were not repaired; and, 2) new supply side sample welds.

Replace supply side piping during next scheduled refuel outage, given procurement constraints (note: Dresden units will necessitate two refuel outages for supply side pipe replacement).

B

Inspect 2x the number of return side indications from previous inspection, plus two. Inspection sample includes all return side welds (with indications) which were not repaired.

New welds

Previously unrepaired welds

Repair weld or replace applicable localized section of piping.

No

New indications?

Yes

No

If new indications are found, initiate repair activities or justify an additional cycle of operation without repair.

Based upon the inspection results of previously unrepaired indications, is one cycle of continued operation without repair justified?

Yes

Return Side

Supply Side

Based on total inspections of return side; indications on > 40% of inspected welds (based upon minimum sample size of 8 welds)?

Yes

No

Based on total inspections of supply side; indications on > 40% of inspected welds (minimum sample size of 6 welds)?

Yes → Go to **B**

No

Replace return side piping during next scheduled refuel outage, given procurement constraints.

For next outage, go to **A**; After third outage of inspections, CECo will discuss results of inspection program with NRC in order to determine future inspection, repair, and/or replacement activities.