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SUBJECT: Responds to request for addl info re GL 88-01.

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Iowa Electric Light and Power Company

April 24, 1989
NG-89-0373

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Response to Request for Additional Information
Regarding NRC Generic Letter 88-01

References: (1) Letter from W. Rothert (Iowa Electric) to T. Murley (NRC) dated July 27, 1988 (NG-88-0973)
(2) Letter from W. Rothert (Iowa Electric) to T. Murley (NRC) dated July 27, 1988 (NG-88-1207)
(3) Letter from J. R. Hall (NRC) to L. Liu (Iowa Electric) dated November 14, 1988.

File: A-107, A-286a, B-31c, SpF-118

Dear Dr. Murley:

By letters dated July 27, 1988 (Reference 1 and 2), we submitted our plans relating to replacement, inspection, and repair of piping susceptible to Intergranular Stress Corrosion Cracking (IGSCC) at the Duane Arnold Energy Center (DAEC). During the NRC review of those submittals, the staff requested that we provide additional information (Reference 3). The attachment to this letter provides our response to that request. For convenience, the staff's questions are repeated in the attachment followed by our responses.

Should you have any additional questions or concerns regarding this submittal, please contact this office.

Very truly yours,

Daniel L. Mineck
Manager, Nuclear Division

DLM/NKP/pjv

Attachment: Response to Request for Additional Information

cc: N. Peterson
R. McGaughy
L. Root
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RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Question 1: (From Attachment A)

NRC Generic Letter 88-01 states, "This Generic Letter applies to all BWR piping made of austenitic stainless steel that is four inches or larger in nominal diameter and contains reactor coolant at a temperature above 200°F during power operation regardless of Code classification. It also applies to reactor vessel attachments and appurtenances such as jet pump instrumentation penetration assemblies and head spray and vent components."

Does the DAEC response cover all welds that are described in the above statement?

Response:

Our response to NRC Generic Letter 88-01 (Reference 1 to this attachment) did not cover all welds described in the above statement. As a result of the staff's question, the entire DAEC piping inspection program was reviewed and a number of revisions to our inspection program have been made.

We now have included a total of 270 welds (i.e., inspection points) in our inspection program. These welds are categorized as follows:

IGSCC Category	Description	Number of Safety Related Welds	Number of Non-Safety Related Welds
A	Resistant materials	3	11
B	Non-resistant materials, SI within 2 years of operation	0	0
C	Non-resistant materials, SI after 2 years of operation	91	0
D	Non-resistant materials, no SI	75	0
E	Cracked, reinforced by weld overlay or mitigated by SI	9	0

F	Cracked, inadequate or no repair	0	0
G	Non-resistant materials not inspected	0	81
	Totals	178	92

The welds added to the IGSCC inspection program are located in non-safety related portions of the Reactor Water Cleanup (RWCU) system. In addition our review resulted in recategorization of some welds. The inspection frequencies for the additional and recategorized welds meet the guidelines of NRC Generic Letter 88-01.

Question 2: (From Attachment A) The DAEC submittal shows inspection schedules for IGSCC Category welds C, D, and E. Are there any welds in DAEC that are classified as IGSCC Categories A, B, or F, and if so have inspection schedules been developed for these welds?

Response: There are no Category B or Category F welds at the DAEC. There are fourteen Category A welds in the RWCU system. Three are in safety-related portions of the system and eleven are in non-safety related portions.

Inspection schedules for the Category A welds have been developed and are consistent with the guidelines of NRC Generic Letter 88-01.

Question 3: (From Attachment A) BWR Nuclear Power Plants often contain materials/welds that are made of susceptible materials that have not been inspected (IGSCC Category G). Are there any such welds in DAEC, and if so, are provisions made for insuring their safety?

Response: The review of our piping/weld inspection program mentioned in our response to Question 1 above identified eighty-one welds that have not been inspected in accordance with the guidelines of NRC Generic Letter 88-01. All of these welds are located in non-safety-related portions of the RWCU system (<u>i.e.</u>, outboard of the second containment isolation valve.) These welds have been added to the revised inspection program described above. We have deferred inspection of these welds until the Spring 1990 refueling outage (see References 3 and 4). We are considering replacement of the piping in non-safety related portions of the RWCU system with IGSCC resistant material.

Question 4: (From Attachment A)

Generic Letter 88-01 states, "It is the staff position that no austenitic material is resistant to cracking in the presence of a crevice, such as formed by a partial penetration weld, where the crevice is exposed to reactor coolant." Are there any such crevices in DAEC, and if so, are provisions made for ensuring their safety?

Response:

There are no known crevices, such as partial penetration welds, in DAEC piping systems to which the guidelines of NRC Generic Letter 88-01 apply.

Question 5: (From Attachment A)

Tables in Attachment to DAEC NG-88-1756 (June 17, 1988) show a total number of 172 welds in IGSCC Categories C, D, and E. Appendix A of Attachment 1 to DAEC NG-88-0973 (July 27, 1988) indicates that there are a total of 179 welds in those IGSCC Categories (i.e., 93 Category C welds, 77 Category D welds, and 9 Category E welds). How are these different totals reconciled?

Response:

The July 27 response (NG-88-0973), added the following seven welds to the inspection schedule which had been inadvertently omitted from the June 17 DAEC response (NG-88-1756):

a. One additional IGSCC Category D weld on the piping described as "RHR-18B" in NG-88-1756.

b. Three additional IGSCC Category D welds on the "A" Recirculation Pump suction piping.

c. Two additional IGSCC Category D welds and one additional IGSCC Category C weld on the "B" Recirculation Pump suction piping.

The additional seven welds account for the discrepancies between the two submittals.

Question 6: (From Attachment A)

On page 2 of DAEC NG-88-0973 (July 27, 1988) it is stated that 104 welds were treated with IHSI. Presumably these welds should be classified as IGSCC Category C welds, but Appendix A of Attachment 1 to DAEC NG-88-0973 (July

27, 1988) shows only 93 welds are classified as IGSCC Category C, why is there a difference of 11 welds?

Response: Prior to the 1985 refueling outage at DAEC, 107 welds were scheduled for IHSI treatment. A pre-IHSI examination revealed indications in recirculation system loop "B" welds RRD-J7 and RRD-J4 and those two welds were removed from the scope of IHSI until repairs (i.e., overlays) could be accomplished. Due to close proximity of the RRD-J4A weld to the RRD-J4 weld, RRD-J4A was also excluded from the IHSI treatment, leaving 104 welds designated for IHSI treatment.

Post-IHSI examinations revealed eight additional indications in the 104 remaining welds treated. (An additional indication was also discovered on the already excluded RRD-J4A weld). Thus, there were a total of eleven indications repaired by nine full structural weld overlays that covered sixteen original welds. Please note that seven of the overlays each covered two original welds. However, we count each overlay as a single "weld" for inspection purposes.

Therefore, of the 104 welds that received the IHSI treatment, indications were detected in eight welds and seven overlays were installed to repair those indications. The seven overlays covered thirteen original welds, leaving 91 welds that had been treated with IHSI but did not require weld overlay repair and are classified as Category C. The total of 93 welds listed in our earlier submittal was incorrect and has been corrected (see our response to Question 1 above).

For further details, please refer to Reference 2.

Question 7: (From Attachment A) On page 2 of DAEC NG-88-0973 (July 27, 1988) it is stated that inspections during the 1985 refueling outage had revealed indications in 11 welds which were repaired with 9 full structural weld overlays. Presumably these welds should be classified as IGSCC Category E, but Appendix A of Attachment 1 to DAEC NG-88-0973 (July 27, 1988) list only 9 welds to be inspected during refueling outages 8 to 13. How are the differences of the number of IGSCC Category E welds reconciled?

Response: As indicated in our response to Question 6 above, the nine overlays cover sixteen original welds, eleven of which have indications. Again, we count each overlay as a single "weld" for inspection purposes.

For further details, please refer to Reference 2.

Question 8: (From Attachment A)

As outlined in Generic Letter 88-01, the staff positions have been covering the following 13 subjects: (1) materials, (2) Processes, (3) Water Chemistry, (4) Weld Overlay, (5) Partial Replacement, (6) Stress Improvement of Cracked Weldments, (7) Clamping Devices, (8) Crack Evaluation and Repair Criteria, (9) Inspection Method, (10) Inspection Schedules, (11) Sample Expansion, (12) Leak Detection, and (13) Reporting Requirements.

The DAEC submittal to Generic Letter 88-01 either specifically outlines or implies their acceptance, past implementation, and future plans to utilize some (but not all) of these staff positions. It would be helpful (although not required) in the evaluation of the DAEC submittal if the following table were completed by the DAEC.

Response:

The following table provides the Iowa Electric position with regard to each of the thirteen staff positions given in Generic Letter 88-01.

Staff Position	DAEC Response: Accept	DAEC Response: Applied In Part	DAEC Has/Will Consider for Future use
1. Materials	yes	yes*	yes
2. Processes	yes	yes**	yes
3. Water Chemistry	yes	yes	yes
4. Weld Overlay Reinforcement	yes	yes	yes
5. Partial Replacement	yes	yes***	yes
6. Stress Improvement of Cracked Weldments	yes	yes	yes
7. Clamping Devices	yes	no	yes
8. Crack Characterization and Repair Criteria	yes	yes	yes
9. Inspection Methods and Personnel	yes	yes	yes
10. Inspection Schedules	yes	yes	yes
11. Sample Expansion	yes	no	yes
12. Leak Detection	yes****	yes	yes
13. Reporting Requirements	yes	yes	yes

* DAEC has used NRC Staff position to assign IGSCC Categories to the welds in service.
** Has applied IHSI but not SET nor HSW.
*** See response to Questions 2 and 3 above.
**** See Reference 5.

Question 1: (From Attachment B) Iowa Electric's July 27, 1988 proposed revision to Table 3.2-E of the DAEC Technical Specifications indicates that any one of six devices provided to monitor drywell leakage is sufficient to assure adequate sump system leak detection capability. Please describe how each of the six devices (flow integrators and timers) is used to perform the leak detection function and discuss the relative reliability and accuracy of each method.

Response: RTS-143A, submitted July 27, 1988 (Reference 5), requested a revision of the DAEC Technical Specifications, including Table 3.2-E, "Instrumentation that Monitors Drywell Leak Detection". This application indicated that any one of six methods is sufficient to detect increased drywell leakage. The six individual methods are:

- Drywell Equipment Drain Sump Flow Integrator
- Drywell Floor Drain Sump Flow Integrator
- Drywell Equipment Drain Sump Pump Run Timer

- Drywell Floor Drain Sump Pump Run Timer
- Drywell Equipment Drain Sump Fill Timer
- Drywell Floor Drain Sump Fill Timer

Leakage in both sumps can be detected by the same three methods which will be described. The only difference between the two sumps is that the Drywell Floor Drain Sump Timers are set to detect unidentified leakage of up to 5 gallons per minute (gpm) while the Drywell Equipment Drain Sump Timers are set to detect identified leakage of up to 25 gpm.

Total leakage within the drywell is divided into two classifications: identified and unidentified leakage. Identified leakage, which is collected in the Drywell Equipment Drain Sump, is composed of normal seal and valve packing leakage. Unidentified leakage is composed of all other leakage from the reactor primary system. Unidentified leakage is collected in the Drywell Floor Drain Sump.

<u>Drywell Sump Flow Integrators</u>

Flow transmitters are located in the discharge piping of both drywell sumps. These flow transmitters send the sump discharge flow signal to flow integrators located in the Control Room back panel area and to a flow recorder in the front panel area. The flow integrators calculate the total amount of fluid discharged from the sumps. The Control Room Operator uses the flow integrators to determine drywell leakage every four hours. Based on the amount of fluid pumped and the time elapsed since previous leakage determination the operator calculates the drywell leakage rates and records them in the Operator's daily logs. The operator also plots leakage rates in order to observe any trends.

<u>Drywell Sump Pump Run Timers</u>

These timers monitor the length of time which a sump pump runs. Each sump has two pumps that are automatically controlled by level switches. A high sump level will initiate operation of the first pump. The Drywell Equipment Drain Sump Timer will start when a pump is running and the sump discharge valve is open. (The additional permissive signal for the Equipment Drain Sump is due to the recirculation mode available for this sump.) When the low sump level is reached, the low level switch stops the running pump automatically. If the pump runs longer than would be needed remove the anticipated leakage from an assumed leakage rate, high leakage in the drywell is indicated. The timer then actuates an annunciator on a control room front panel.

Drywell Sump Fill Timers

The sump fill timers are used to monitor the frequency of pump starts. The timer starts when pump operation is initiated by high sump level and continuing to run after pumping has stopped. If pump operation begins again before the time setting expires, the sump is filling faster than the set leakage rate and high drywell leakage is indicated. The timer then activates an annunciator on a control room front panel.

Any one of the six drywell leak detection methods can detect increased drywell leakage. The Drywell Equipment Drain Sump and the Drywell Floor Drain Sump are located next to each other beneath the reactor inside the reactor vessel pedestal. If the three leak detection capabilities for one sump system were inoperable, the automatic start feature of the pumps in that sump would be disabled. The sump would then fill and overflow into the operable sump. An estimate of the time to fill and overflow the sump would be made based on an assumed leakage rate. Additionally, if the Drywell Floor Drain Sump were incapable of detecting increased unidentified leakage, the timers for the Drywell Equipment Drain Sump would be recalibrated to allow the detection of a 5 gpm unidentified leakage rate.

The volumes of the Floor Drain and Equipment Drain sumps are approximately 850 gallons each. The sump pumps stop when approximately 200 gallons remain in each sump. With a 5 gpm leakage rate, one sump would be filled and begin to overflow to the other sump in approximately 2 hours 10 minutes. With a 2 gpm leak, the time would be approximately 5 hours 25 minutes. Thus, even if all the instrumentation from one sump is inoperable, the other sump would fill and begin to detect the leakage within a single 8-hour shift such that the Control Room operators could take the actions described above.

The four timers are functionally tested on a quarterly basis and calibrated annually. They are verified to be within 5% of the timer setting during the functional test. A view of the surveillance and maintenance history for these timers indicates reliable performance. As part of the Preventative Maintenance Program, these timers are replaced every six years.

The flow integrators are calibrated on a quarterly basis and can determine leakage rates to the hundredth of a gallon per minute. A review of the surveillance and maintenance history indicates that the flow integrators perform reliably. Because the Operator calculates drywell leakage from these flow integrators every four hours, their failure is detected in a timely manner and corrective actions are taken immediately.

References:

(1) Letter from W. Rothert (Iowa Electric) to T. Murley (NRC) dated July 27, 1988, Subject: Response to Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel," (NG-88-0973).

(2) Letter from R. McGaughy (Iowa Electric) to H. Denton (NRC) dated May 3, 1985, Subject: Results of Inspection of Stainless Steel Piping at the Duane Arnold Energy Center, (NG-85-1901).

(3) Letter from W. Rothert (Iowa Electric) to T. Murley (NRC) dated October 21, 1988, Subject: NRC Generic Letter 88-01 Inspection Schedule Guidelines (NG-88-3593).

(4) Letter from J. Hannen (NRC) to L. Liu (Iowa Electric) dated December 15, 1988, Subject: Duane Arnold Energy Center - Reactor Water Cleanup Weld Inspection Relief Request (TAC No. 71041).

(5) Letter from W. Rothert (Iowa Electric) to T. Murley (NRC) dated July 27, 1988, Subject: Request for Technical Specification Change (RTS-143A): IGSCC Augmented Inservice Inspection Requirements, (NG-88-1207).