Iowa Electric Light and Power Company
January 5, 1981
LDR-81-18

LARRY D. ROOT
ASSISTANT VICE PRESIDENT
OF NUCLEAR DIVISION

Mr. James G. Keppler, Director
Office of Inspection and Enforcement
Region III
Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Re: Duane Arnold Energy Center
Subject: IE Bulletin No. 80-24, Prevention of Damage Due to Water Leakage Inside Containment (10/17/80 Indian Point 2 Event)
File: NRC-2, Bulletin 80-24

Dear Mr. Keppler:

In response to your letter transmitting the subject bulletin concerning problems associated with cooling water system leakage inside containment, we have completed our review of the actions to be taken by licensees. The following discussion provides the requested information and actions taken at DAEC to address these NRC IE Bulletin concerns.

Item 1. Provide a summary description of all open cooling water systems present inside containment. Your description of the cooling water systems must include: (a) Mode of operation during routine reactor operation and in response to a LOCA; (b) Source of water and typical chemical content of water; (c) Materials used in piping and coolers; (d) Experience with system leakage; (e) History and type of repairs to coolers and piping systems (i.e., replacement, weld, braze, etc.); (f) Provisions for isolating portions of the system inside containment in the event of leakage including volunerability of those isolation provisions to single failure; (g) Provisions for testing isolation valves in accordance with Appendix J to 10 CFR 50 (h) Instrumentation (pressure, dew point, flow, radiation detection, etc.) and procedures in place to detect leakage; and (i) Provisions to detect radioactive contamination in service water discharge from containment.

Response: A review was conducted of all cooling water systems utilized at DAEC. The drywell cooling water system is the only system in use at DAEC which fits the NRC definition of an "open" cooling water system inside containment. The drywell cooling water system is a subsystem of the DAEC well water system which supplies cooling water from wells located on DAEC

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via three plant site property well pumps. The well water system provides cooling to various plant ventilation coolers including four (4) control rod drive cooling coils, four (4) drywell cooling coils, and four (4) recirculation pump cooling coils all physically located inside the DAEC drywell. The drywell cooling water passes thru these cooling coils and then is sent to the circulating water system, via a connection with the RHR Service and Emergency Service Water header, and subsequently discharged to the DAEC cooling towers.

(a) During routine reactor operation the well water system (drywell cooling water system) supplies cooling water to the cooling coils tabulated above located inside the drywell. The drywell cooling water system supply/return containment isolation valves close automatically only upon receipt of a reactor vessel low-low-low water level or high drywell pressure isolation signal. The drywell cooling water system is not open to either the reactor of the drywell. In the event of a LOCA, failure of the drywell cooling water system piping would have to occur in order for there to be any communication between the reactor or the drywell environment and the area outside the drywell.

(b) The well water system is the source of water for the drywell cooling water system. The attached Table 1 provides representative treated well water analysis data which was obtained on November 6, 1980. It should be noted that DAEC well water is treated with NALCO #918 (polyphosphate additive) prior to use in order to prevent plating out of solids in solution.

(c) All of the drywell cooling water system piping is 150 lb. schedule 40 seamless ASTM A-53 Grade B or A-106 Grade B (2 1/2 piping and larger or schedule 80 seamless ASTM A-106, Grade B (2" piping and smaller). All piping was designed in accordance with ANSI B31.1.0.

The coolers are supplied by the Marlo Coil Works division of H. K. Porter Co., Inc. The coil assembly tubes are 0.049" wall x 5/8" O.D. expanding temper copper #122, the fins are 0.010" Thk. x 6" wide x 48-38" flat "plate" copper, and the cooling water headers are 1 5/8" O.D. copper tubing. The balance of the cooler coil assembly components including intermediate and end tube sheets and filler pieces are carbon steel, HDGAF (hot dipped galvanized after fabrication) in accordance with ASTM Spec. #A386. The cooling water connection stubs which mate the cooling coil copper headers with the well water supply/return carbon steel piping are 1 1/2" schedule 80 carbon steel pipes.

(d) and (e) To date, there have been no leakage problems or repair work performed on the cooler cooling coils inside the drywell. There were minor supply/return piping leakage problems which resulted in a piping design change to inspect all and replace some of the carbon steel piping inside the drywell during the 1978 refueling outage.

The sections of pipe which were replaced in 1978 immediately downstream of the circuit flow setter valves were found to have reduced wall thickness due to pitting and erosion. It is believed that the pipe erosion in the sections of piping replaced was induced by flow restrictions due to the circuit setter settings (most of which were less than 30% open). The circuit setters were adjusted to the fully open position and the down-stream sections of well water piping were replaced with Schedule 160 carbon steel pipe in order to provide additional corrosion/erosion allowance. There have been no further problems or necessary repair work associated with the well water piping inside the drywell.

(f) There are two redundant drywell cooling water subsystems. Each has remotely operated, motor operated butterfly valves on the supply/return lines for individual cooling coils in each subsystem. There are also air operated isolation valves outside the drywell and manual gate valves on the well water system piping headers to and from the drywell for each subsystem. Thus, it is possible to isolate an entire drywell cooling subsystem or any individual cooling coil within a subsystem inside the drywell without entering the drywell.

(g) Design provisions have been included for Type C local leak rate testing (LLRT) of the well water supply/return/backwash containment isolation valves in accordance with Appendix J to 10 CFR 50 (i.e., appropriate air test and vent connections and drain connections). The LLRT of the well water system was most recently performed at DAEC during the 1980 refueling outage and the results of this testing were transmitted to your office by letter of July 15, 1980 (DAEC-80-331, IELPC (D.L. Mineck) to NRC (James G. Keppler).

(h) The instrumentation, procedures, and DAEC Technical Specifications requirements in place to detect leakage inside the drywell are discussed under Item 2 below.

(i) The drywell cooling water system water is routed through the cooling coils inside the drywell and is subsequently sent via a well water system connection with the RHR Service/Emergency Service Water header to the DAEC circulating water system. The RHR Service/Emergency Service Water header is monitored for radiation downstream of the well water system and upstream of the connection with the DAEC circulating water system. The RHR Service/Emergency Service Water system radiation monitor location and recorder/alarms (high and low) in the control room are as depicted on DAEC Piping and Instrument Drawing 7884-M-113.

Item 2. For plants with open cooling water systems inside containment, take the following actions:

a. Verify existence or provide redundant means of detecting and promptly alerting control room operators of a significant accumulation of water in containment (including the reactor vessel pit if present).

b. Verify existence or provide positive means for control room operators to determine flow from containment sump(s) used to collect and remove water from containment.

c. Verify or establish at least monthly surveillance procedures, with appropriate operating limitations, to assure plant operators have at least two methods of determining water level in each location where water may accumulate. The surveillance procedures shall assure that at least one method to remove water from each such location is available during power operation. In the event either the detection or removal systems become inoperable, it is recommended that continued power operation be limited to seven days and added surveillance measures be instituted.

d. Review leakage detection systems and procedures and provide or verify ability to promptly detect water leakage in containment, and to isolate the leaking components or system. Periodic containment entry to inspect for leakage should be considered.

e. Beginning within 10 days of the date of this bulletin, whenever the reactor is operating and until the measures described in (a) through (d) above are implemented, conduct interim surveillance measures. The measures shall include where practical (considering containment atmosphere and ALARA coinsiderations) a periodic containment inspection or remote visual surveillance to check for water leakage. If containment entry is impractical during operation, perform a containment inspection for water leakage at the first plant shutdown for any reasons subsequent to receipt of this bulletin.

f. Establish procedures to notify the NRC of any service water system leaks within containment via a special licensee event report (24 hours with written report in 14 days) as a degradation of a containment boundary.

Response: a. There is a drywell floor drain sump (unidentified leakage) and a drywell equipment drain sump (identified leakage). Each sump has two (2) sump pumps inside the drywell which are designed to handle all normal identified equipment drainage and a significant unidentified source of leakage. The sumps are arranged such that high level in one sump will overflow into the other sump. Unidentified leakage is measured every four hour period in order to ensure that DAEC Technical Specifications Section 3.6.C.1, allowable drywell leakage, is not exceeded. Drywell unidentified leakage is determined by run times on the floor drain sump pumps utilizing flow instrumentation (integrator and timers). Also, each sump has high level switch and alarm which annunciates in the DAEC control room and each set of sump pumps has a "pump out" timer which will activate an alarm in the control room should the pump run excessively, a condition which would be indicative of a leak from some source inside containment or of pump failure.

Also, drywell atmosphere radiation detectors are provided (air sampling system) as a backup method of leak detection. If the sump pumps fail, the DAEC drywell/suppression pool arrangement is such that a "significant accumulation" of water inside the drywell would drain into and be detected in the suppression pool. There is direct communication between the drywell and the suppression pool such that an accumulation of approximately two feet of water on the floor of the drywell would spill into the downcomers to the suppression pool. Any significant amount of water would be detected by suppression pool level instrumentation. High and Low suppression pool level alarms are provided so that an alarm actuates before the Technical Specification torus water volume limits are reached.

b. In order to determine the floor drain sump (unidentified) and equipment drain sump (identified) drywell leakage rates and in order to ensure compliance with the DAEC Technical Specification Section 3.6.C.1 allowables, each sump pump system is provided with pump discharge flow integraters and timers. All of the pertinent information on drywell sump pump operation and discharge flows is transmitted to the control room. This provides a positive means for control room operators to readily determine flow from the drywell sumps.

c. DAEC plant operators determine the drywell identified and unidentified leak rate, using the sump equipment discussed in Item 2.b above, in accordance with the DAEC daily Surveillance Test Procedures (STP) 42A001. DAEC Technical Specifications Sections 3.6.C.2 and 3.6.C.3 require that both the drywell sump and air sampling systems must be operable during reactor power operation. If one of these two systems is found to be inoperable for any reason, reactor power operation is permissible only during the succeeding seven days unless the system is made operable sooner.

Also, in addition to the DAEC Technical Specifications drywell system operability and drywell leakage requirements, IELPC has a separate agreement (response to NRC Bulletin 74-10B and March 1, 1979 letter from L. Liu to H. Denton) with the NRC that a reactor shut-down must be initiated if the unidentified drywell leakage is observed to increase by 2 gpm in any 24 hour period, or doubles in a 4 hour period. This requirement is also reflected in DAEC STP 42A001.

d. The drywell leakage detection systems at DAEC have been discussed in Items 2.a through 2.c above. Isolation of the "open" drywell cooling water system (well water system) piping and components was discussed in Item 1 (f) above.

In accordance with commitments made in response to the September 13, 1979 letter from D. G. Eisenhut to all licensees, wide range level instrumentation and recorders for both drywell and torus level are scheduled to be installed at DAEC during the 1981 refueling outage. This will add additional assurance and redundancy to promptly detect leakage inside the drywell.

Due to the drywell nitrogen blanketing system, periodic drywell entry to inspect for leakage is totally impractical for DAEC. The next DAEC routine inspection for equipment leakage will be conducted as part of the refueling outage work.

e. No interim surveillance measures have been deemed necessary at DAEC. We believe that the subject IE Bulletin requirements of Items 2.a through 2.d are fulfilled with the existing DAEC drywell leakage detection/measurement systems, operating/surveillance procedures, and Technical Specifications requirements regarding unidentified drywell leakage. A drywell leakage inspection will be made when DAEC is shutdown for the 1981 refueling outage.

f. Any violation of the drywell allowable leakage rates as addressed in DAEC Technical Specifications Section 3.6.C.1 would be reported to the NRC via prompt notification within 24 hours and a written Licensee Event Report within 14 days. The present DAEC Technical Specifications Section 6.11.2 reporting requirements and DAEC SPECIAL ORDER #General-360 require prompt notification and LER submittal of any leakage greater than the DAEC Technical Specification limits. Therefore no DAEC procedure modification is necessary to ensure prompt notification of any well water system or other system leaks inside the drywell in excess of the DAEC Technical Specification limits.

Item 3. For plants with closed cooling water systems inside containment provide a summary of experiences with cooling water system leakage into containment.

Response No significant DAEC closed cooling water system leakages have occurred inside the drywell.

If you have any questions or desire further information regarding this IE Bulletin, please contact this office.

Approximately 80 man-hours were required to gather the necessary information and prepare the response to this IE Bulletin.

This response is true and accurate to the best of my knowledge and belief.

IOWA ELECTRIC LIGHT AND POWER COMPANY

By: B.W. McDaugh for
Larry D. Root
Assistant Vice President,
Nuclear Generation

Subscribed and Sworn to before me this 5th day of January, 1981.

Mary E. Benfield
Notary Public in and for the State of Iowa

NOTARIAL SEAL IOWA
MARY E. BENFIELD
My Commission Expires
SEPTEMBER 30, 1983

LDR/DWT/mb

Attach.

cc: U.S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
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U.S. Nuclear Regulatory Commission
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ATTACHMENT 1

DUANE ARNOLD ENERGY CENTER

Treated Well Water

Report of Water Analysis

Date: November 6, 1980

Time: 0745 Hrs

System: Well Water System

ph e 25°C 7.38

Conductivity 44.0 pmho/cm

Chloride 1.00 ppm Cl^-

Silica 12.5 ppm $Si\ O_2$

Turbidity 7.2 FTU

Total Hardness 280 ppm $CaCO_3$

Calcium Hardness 200 ppm $CACO_3$

Magnesium Hardness 80 ppm $CaCO_3$

"MO" Alkalinity 160 ppm $CaCO_3$

Sulfate 34 ppm $S\ O_4^=$

Total Solids 334 ppm

Dissolved Solids 306 ppm

Filterable Solids 28 ppm

Total Phosphates 3.35 ppm

Ortho Phosphates 3.0 ppm

Meta Phosphates 0.35 ppm