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DENTON,H. Office of Nuclear Reactor Regulation, Director

SUBJECT: Summaries results of wetwell/drywell (W/D) vacuum breaker calculations per Generic Ltr 83-08,Calculations indicate certain components of W/D vacuum breaker could exceed allowables when subjected to design impact velocities.

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Iowa Electric Light and Power Company
July 29, 1983
NG-83-2619

Mr. Harold Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: Duane Arnold Energy Center
Subject: Modification of Wetwell/Drywell Vacuum Breakers
Reference: 1) NRC Generic Letter 83-08
2) IE Letter NG-83-1771

Dear Mr. Denton:

This letter will summarize the results of the Wetwell/Drywell (W/D) vacuum breaker plant unique calculations made for the Duane Arnold Energy Center (DAEC) and provide a response to Reference #1.

The results of the aforementioned calculations indicate that certain components of the W/D vacuum breaker could exceed code allowables when subjected to design "impact velocities" which presently calculated to be 6.75 Radians/sec. (refer to Attachment #1). The expected impact velocity for the valves, however, has been calculated to be 5.72 Radians/sec.

This potential overstressed condition has proven, however, to be acceptable under the guidelines of the Mark I Short Term program guidelines because the "strength ratio" of these components does not exceed 0.50. (The "Strength Ratio" is defined as the most probable applied load divided by the most probable load that will cause failure.)

In order to increase the integrity of these assemblies and to restore the original design margin, Iowa Electric (IE) will replace the affected components with components fabricated from materials having higher code allowable stresses (refer to Attachment #2).

The following is a summary of the modifications which are anticipated to be made to the W/D vacuum breaker at the DAEC:

a) Replacement of the W/D vacuum breaker pallets (SA-516 Gr 70) with SA-705 Gr 630 (age hardened @ 1100°F)

b) Replacement of the W/D vacuum breaker hinge shafts (SA-320 B8) with SA-564 Gr 630 (age hardened @ 1100°F)

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c) Replacement of the W/D vacuum breaker hinge arms (SA-516 Gr 70) with SA-564 Gr 630 (age hardened @ 1100°F)

d) Replacement of the W/D vacuum breaker hinge arm studs (SA-320 B8) with SA-564 Gr 630 (age hardened @ 1100°F)

Additionally, because of the sealing gasket "fold-over", which was evidenced at the Full-Scale Test Facility after completion of test No. M1, the original gasket will be replaced by an improved design. The new gasket will be a steel-ring-stiffened design which has proven to seal properly and eliminate the "fold-over" condition.

The above modifications will be completed during the next refueling outage which currently is scheduled for the fall of 1984, as stated in reference #2.

If you should have any additional questions in regard to this matter, please contact this office.

Very truly yours,

R. W. McDaughy

Richard W. McGaughy
Manager, Nuclear Division

RWM/BWR/rh*

Attachments: Attachment 1, Stress Levels by Component for 18-Inch GPE Vacuum Breaker
Attachment 2, Higher Strength Replacement Materials for 18-Inch GPE Vacuum Breaker

cc: B. Reid
L. Liu
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H. Rehrauer
T. Shugart
F. Apicella
NRC Resident Office
Commitment Control No. 83-0139

ATTACHMENT 1

STRESS LEVELS BY COMPONENT
FOR 18-INCH GPE VACUUM BREAKER

Component	Existing Material	ASME Allowable Stress (ksi)	Stress (ksi) for Various Pallet Impact Velocities 3.0 (rad/sec)	4.5 (rad/sec)	9.3 (rad/sec)
Pallet	SA-516 Gr 70	35.0	21.6	32.4	67.0
Hinge Arm	SA-516 Gr 70	35.0	11.8	17.7	36.6
Hinge Shaft	SA-320 B8	30.0	19.1	28.6	59.2
Hinge Arm Stud	SA-320 B8	30.0	12.5	18.8	38.8

ATTACHMENT 2

HIGHER STRENGTH REPLACEMENT MATERIALS
FOR 18-INCH GPE VACUUM BREAKER

Component	Material	Allowable Stress
Pallet	SA-705 Gr 630 (age hardened at 1100°F)	70 ksi
Hinge Shaft Hinge Arm Hinge Arm Stud	SA-564 Gr 630 (age hardened at 1100°F)	70 ksi