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June 1, 1982

Mr. A. Schwencer, Chief  
Licensing Branch #2  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

Subject: LaSalle County Station Units 1 and 2  
Drywell/Wetwell Vacuum Breakers  
NRC Docket Nos. 50-373 and 50-374

Dear Mr. Schwencer:

As requested during our May 21, 1982 telecon with Dr. A. Bournia, et al this letter summarizes the presentation CECO made May 20, 1982 in Bethesda to CSB and provides further basis for our conclusion of vacuum breaker adequacy during pool swell.

LaSalle vacuum breakers are twenty-four inch, single disk, GPE valves located in lines external to containment. These lines are isolatable both upstream and downstream by normally open butterfly valves which are manually actuated from the control room. GPE vacuum breaker valves (Figure 1) are different in design from Anderson Greenwood (AG) valves (Figure 2). The lever arm connecting the AG disk to the hinge pin transfers impact and velocity loads in a more concentrated way than the bolted GPE flange. That is, the connection of the AG arm to disk is subject to much stress. The difference in valves also makes the GPE design more favorable under impact loading because of the reduced bending moment on the GPE hinge flange compared to the AG arm.

Calculations by the Mark II Containment Owners Group predict maximum valve opening velocity of 23.6 radians/second and maximum closing velocity of 20.4 radians/second. LaSalle's valves were evaluated by analysis similar to the method used on other valve operability issues. A stress calculation on the weakest affected components (hinge pins) was performed combining all appropriate loads including velocity and impact loads of the valve disk. The velocity and impact loads were determined by a conservative hand calculation. No credit was taken for energy absorbed by elastically deformed components. Duration of impact between disc and seat was not part of the LaSalle method. The method solves for forces at the hinge pin considering the free body diagram of the valve disc just prior to impact (max. velocity) and at impact (max. seat reaction). An equation of the sum of the forces and an equation of the sum of the moments are solved as a system of equations for forces at the hinge pin effectively placing the entire reaction at the hinge pin.

Boo!

June 1, 1982

This method used an impact dynamic factor of 2 which doubled the force exerted by the seat. The calculated maximum bearing stress in the hinge pin was 23,252 psi which is less than the 30 ksi yield stress allowed by ASME-Section III. Operability of the valve is assured by using a faulted loading combination and the stresses falling within material allowables for service level A. Pin deflection is negligible. A summary of the calculated forces and stresses is provided in the attached table.

In summary, the method used to calculate stress assumed total load transfer to the hinge pin to conservatively predict stress on the weakest affected component of the LaSalle vacuum breakers. The method was a conservative calculation and our evaluation concludes that stress in the vacuum breaker valves during pool swell will not exceed the ASME B&PV Code Section III stress allowables. Therefore they will remain fully operable after the maximum postulated pool swell.

If there are any further questions in this matter, please contact this office.

Enclosed for your use are one (1) signed original and thirty-nine (39) copies of this letter and attachment.

Very truly yours,

*CW Schroeder 6/1/82*

C. W. Schroeder  
Nuclear Licensing Administrator

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Attachments

cc: NRC Resident Inspector - LSCS

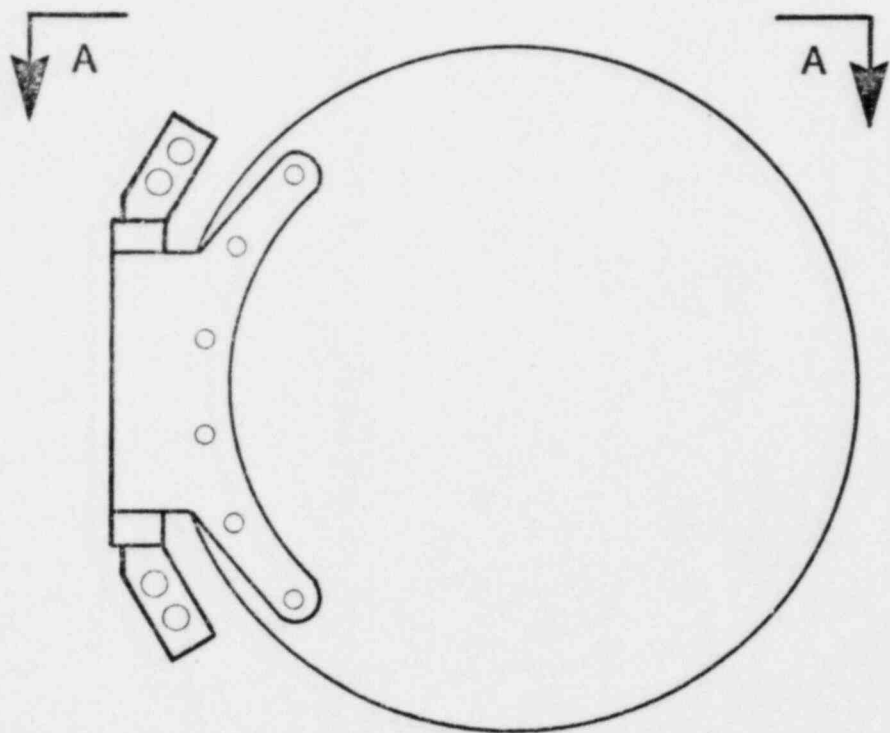
4241N

Maximum Bearing Load (lbf)

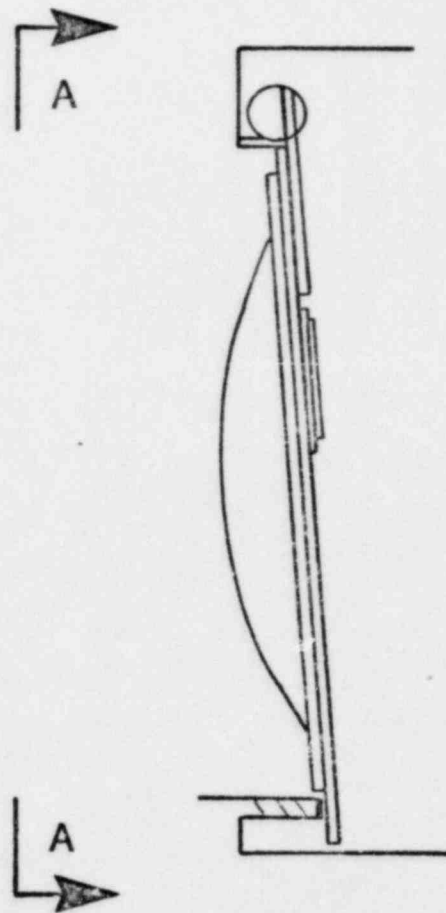
LOADING CONDITION	OPENING - JUST PRIOR TO IMPACT	OPENING IMPACT	CLOSING IMPACT
DYNAMIC	2,876	806	766
SEISMIC	170	170	170
PRESSURE DIFFERENTIAL	211	1,730	1,730
TOTAL	3,257	2,706	2,666

Summary of Stresses

COMPONENT	MAX STRESS (KSI)	TYPE	ALLOWABLE STRESS (KSI)	REMARKS
HINGE PIN	10.62	SHEAR	12.0	Allowable stresses are taken at normal load level and loads are used for faulted condition.
HINGE PIN	23.25	Bearing / Compression	30.0	Average stress value is much smaller
HOLDING BOLT	23.26	SHEAR	37	stress based on root area of bolts
DISC	2.30	BENDING	17.5	Disc is least stressed



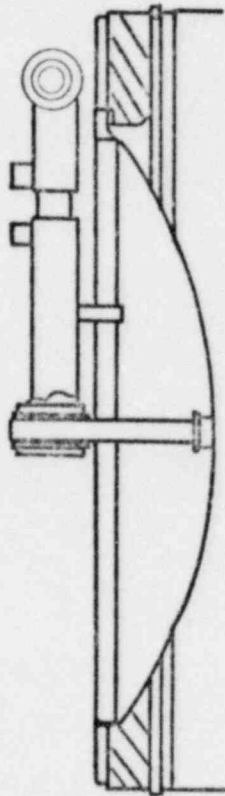
PLAN "A-A"



VIEW "A-A"

GPE VALVE

Figure 2



ANDERSON - GREENWOOD VALVE