DmB

Northern States Power Company

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September 17, 1984

Mr J G Keppler
Regional Administrator, Region III
Office of Inspection and Enforcement
US Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Prairie Island Nuclear Generating Plant
Docket No. 50-282, License No. DPR-42
Docket No. 50-306, License No. DPR-60

In response to IE Bulletin 84-03, the following is offered.

Potential for and the consequences of a refueling cavity water seal failure have been evaluated. The evaluation included consideration of: gross seal failure; maximum leakage rate due to failure of active components such as inflated seals; makeup capacity; time to cladding damage without operator action; potential effect on stored fuel and fuel in transfer; and emergency operating procedures.

The gap between the reactor vessel flange and the refueling cavity floor is 2 inches. The gap is bridged by a single inflatable seal. See Figure attached. Testing has shown that the seal is leaktight whether inflated or deflated. Failure of an active component will not cause significant leakage from the cavity.

Since the Prairie Island seal is a passive component, we could not postulate a credible failure that would result in fuel clad damage. In order to address the items in the Bulletin, however, an event which we consider extremely unlikely was postulated. The seal is covered with holddown plates before flooding the cavity. We postulated one holddown plate was removed and the seal under the plate torn away, opening the 2-inch gap between the adjacent holddown plates. Conservative calculations give an initial leakage rate of about 4200 gal/min.

Makeup can be supplied from the CVCS blender to the spent fuel pool, the CVCS holdup tanks to the spent fuel pool, or the RHR pumps from containment sump B to the reactor coolant system. Flow rates and capacities of these methods are:

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	FLOWRATE	CAPACITY
CVCS blender from RMU Tank	80 gpm/pump	40,000 gal/tank
(4 pumps)	320 gpm	160,000 gal
CVCS holdup tanks	500 gpm	18,000 - 65,000 gal
RHR from Sump B (1 pump)	2,000 gpm	unlimited
(2 pumps)	4,000 gpm	recirc

Makeup could result in a decrease in boron concentration. Conservative calculations show that fuel in all locations remains subcritical.

Assuming the maximum leakage rate and no operator action, fuel in the reactor vessel, refueling cavity fuel transfer area and spent fuel pools will remain underwater and no fuel damage will result. Fuel being handled by the manipulator crane in containment or the spent fuel handling crane in the spent fuel pool area could become uncovered without operator action. The estimated minimum time to fuel clad damage is 50 minutes after initiation of the leak. The operator has at least 30 minutes to begin lowering the fuel assembly into an area where it will remain covered before high radiation levels caused by reduced shielding would require his departure from the area.

The procedure governing reactor refueling operations addresses a decrease in refueling cavity water level. Alarm response procedures for containment sump C high level or spent fuel pool low level lead the operator to the refueling procedure above. The immediate actions of the procedure are to lower any fuel in the manipulator crane or on the spent fuel handling crane to a level below the cavity seal. In the worst case, active fuel would be covered with 7 inches of water. This would result in 133R/hr at the surface of the water and 64mR/hr at the refueling floor level above the assembly. Although there is a significant increase in radiation level, repair of the seal could be done.

In conclusion, the evaluation showed there is no active failure which could cause significant leakage from the refueling cavity. The leakage that was postulated here is extremely unlikely and small enough that operator action can easily place the fuel assembly where it will remain covered.

Unit 2 is currently shutdown for refueling. It is intended that fuel handling begin on Friday, September 21.

C E Larson

C E Larson
Vice President Nuclear Generation

cc: G Charnoff
J Hard
NRC Document Control Desk

Attachment

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

Docket No. 50-282
Docket No. 50-306

RESPONSE TO I.E. BULLETIN 84-03

Northern States Power Company, a Minnesota corporation, hereby submits the response to I.E. Bulletin 84-03 for the Prairie Island Nuclear Generating Plant.

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By: C E Larson
C. E. Larson
Vice President Nuclear Generation

On this 17th day of September, 1984, before me a notary public in and for said County, personally appeared C. E. Larson, Vice President Nuclear Generation, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof and that to the best of his knowledge, information and belief, the statements made in it are true and that it is not interposed for delay.

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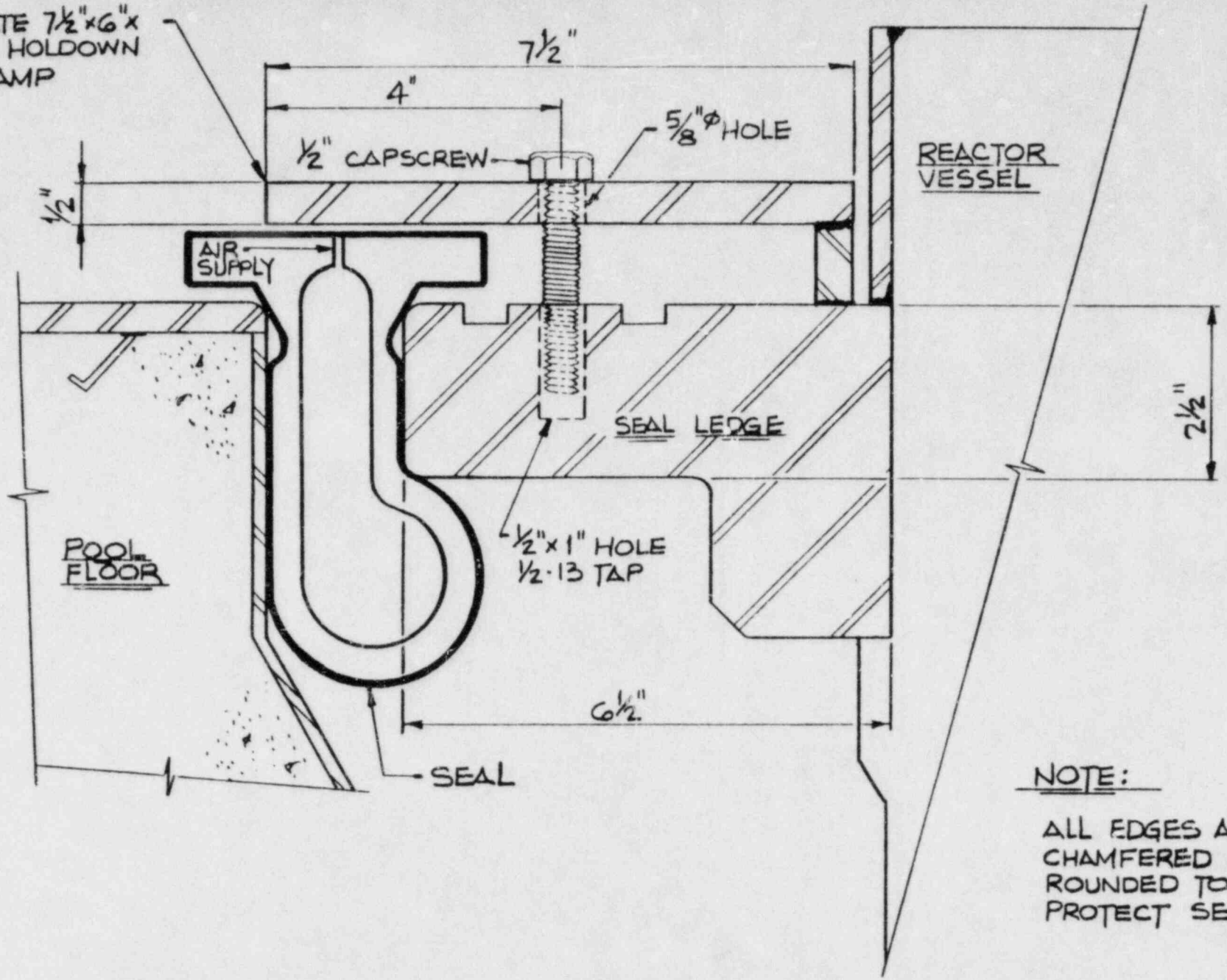
DODY A. BROSE
NOTARY PUBLIC — MINNESOTA
HENNEPIN COUNTY
My Commission Expires Dec. 26, 1989



NOTE:

ALL EDGES ARE CHAMFERED OR ROUNDED TO PROTECT SEAL

PNEUMA SEAL FOR REACTOR CAVITY

Figure for attachment to NSP Prairie Island response to I.E Bulletin 84-03