NSP

NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

June 3, 1980

R E Martin, Operating Reactors Branch #3

Subj: Response to EG&G Questions dtd May 13, 1980,
J H Cooper, EG&G, to R E Martin, NRC

1. November 14, 1980 letter is attached

2. LOCA dose calculations have not yet been completed

3. Attachment 1, item 1:

Relay circuit. See drawings. X-H1AW-1-986 RevA
X-H1AW-1-994 RevA

4. Attachement 1, item 2: NE-4009 Sheet 141

Monitors are redundant. Gas and particu'ate monitors are provided. Each gives isolation signal.

5. Attachment 1, item 3:

No keylock switches or other physical features are used.

6. Attachment 1, item 4:

Only SI reset is annunciated in the control room.

7. Attachment 1, item 5:

No justification. This is a feature of the original plant design. Modifications are being considered.

David Musolf

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NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

April 12, 1979

Director of Nuclear Reactor Regulation
U S Nuclear Regulatory Commissiont
Washington, DC 230555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket No. 50-282 License No. DPR-42
50-306 DPR-60

Containment Purging During Normal Plant Operation

In a letter dated November 29, 1978 from Mr A Schwencer, Chief, Operating Reactors Branch #1, Division of Operating Reactors, USNRC, we were informed of a number of events occurring at other facilities which reduced the effectiveness of automatic isolation of containment purge valves. In our letter dated January 5, 1979 we provided a preliminary reply to Mr Schwencer's letter and stated that we would contact Westinghouse Electric Corporation to evaluate the impact of purging on ECCS performance.

Attachment (1) contains the results of a Westinghouse calculation assessing the impact of containment purging at the time of a LOCA on calculated Prairie Island ECCS performance. As noted in this attachment, operation of the 18-inch inservice purge system during normal plant operation should have a negligible impact on ECCS performance in the event of a LOCA. Operation of the 36-inch purge system with the reactor shutdown also has a negligible impact on ECCS performance in the event of a LOCA.

The radiological consequences of operation of either purge systems at the time of a LOCA are negligible. As demonstrated in the Prairie Island LOCA Analysis submitted to the Commission on February 21, 1979, no clad failure will occur in the three seconds required to close the containment purge valves.

An evaluation of the containment purge isolation instrumentation and control circuitry is contained in Sections 5.3 and 7.5 of the Prairie Island FSAR. The design used is extremely reliable and will guarantee purge valve closure occurs in the event of a LOCA during containment purging.

Please contact us if you have additional questions related to this matter.

Yours very truly,

L. O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/DMM/ak

cc: J G Keppler
G Charnoff

Attachment

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Attachment (1)
NSP Letter dated April 12, 1979
Containment Purging During Normal Plant Operation

According to Branch Technical Position CSB6-4, evaluation of a containment purge system design should include "an analysis of the reduction in containment pressure resulting from the partial loss of containment atmosphere during the accident for ECCS backpressure determination". Such an analysis has been performed for the Prairie Island Plant based on the containment conditions defined in the limiting FAC analysis case (DECLG break, $C_D = 0.4$) obtained using the February 1978 Westinghouse Evaluation Model. The containment isolation signal received in that analysis will initiate valve closure shortly after inception of the LOCA. The inservice purge system utilized during reactor operation consists of two 18-inch diameter lines. It is conservatively represented in this computation as follows:

1. A 3 second isolation valve closure time is assumed. No credit is taken for the reduction in effective flow area which occurs while the valve is in the process of closing.

2. The frictional resistance association with duct entrance and exit losses, filters, ductwork bends and skin friction has not been considered.

3. No fan coastdown effects are considered.

4. No inertia is considered. Steady state flow out the purge system ducts is established immediately at the time of the LOCA.

A mixture of steam and air will be exhausted from the containment through the purge lines during the time that the isolation valves are assumed to remain open. The effect of the composition of the gas being exhausted on containment pressure has been bounded by investigating the two extreme cases, air alone and steam alone. Within several seconds of the inception of the LOCA, containment pressure will have increased to the point that critical flow will occur in the purge lines. To conservatively bound the calculated containment gas mixture exhausted through the purge lines, critical flow rates of steam and air were calculated during the $C_D = 0.4$ DECLG break transient. Using these flowrates, critical flow was conservatively assumed to be in effect from time zero. Equation (4.18) in Reference (1), was employed to calculate the critical flow rate of air through the Prairie Island purge lines. Figure 14 of Reference (2) was applied to compute the critical flow rate of steam through the purge lines. The total mass released during the time period that the valves are presumed open is calculated as 1553 lbs. air or 1123 lbs. steam. The impact on containment pressure resulting from this loss of air or of steam is less than 0.35 psi in either case. The effect of a containment pressure reduction of this magnitude on the calculated peak clad temperature (PCT) is expected to be minor (less than 20°F). Therefore, the results of this evaluation indicate that the Prairie Island Units should meet 10 CFR 50.46 requirements even if the containment inservice purge system is operating at the time of a LOCA event.

Attachment (1)
NSP Letter dated April 12, 1979
Containment Purging During Normal Plant Operation

When the reactor is shutdown, a containment purge system consisting of two 36 inch diameter lines is used for ventilation. A computation identical to that described above was performed for the 36 in. line size. Assuming only air is released, 6213 lbs. air are lost from the containment building while the isolation valves remain open; if only steam is released, 4492 lbs. are lost. In either case the impact on the calculated containment pressure is less than 1.4 psi. The impact of a containment pressure reduction of this magnitude on the calculated PCT will be minor compared to the reduction in PCT associated with shutdown conditions. Therefore, use of the 36-inch diameter containment purge system while the reactor is shutdown would not violate 10 CFR 50.46 criteria.

REFERENCES:

(1) Shapiro, A. H., The Dynamics and Thermodynamics of Compressible Fluid Flow, Volume 1, p. 85.

(2) 1967 ASME Steam Tables, p. 301.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

October 29, 1979

Docket Nos. 50-282
and 50-306

Mr. L. O. Mayer, Manager
Nuclear Support Services
Northern States Power Company
414 Nicollet Mall - 8th Floor
Minneapolis, Minnesota 55401

Dear Mr. Mayer:

RE: Containment Purging and Venting During Normal Operation

By letter dated November 28, 1978, the Commission (NRC) requested all licensees of operating reactors to respond to generic concerns about containment purging or venting during normal plant operation. The generic concerns were twofold:

(1) Events had occurred where licensees overrode or bypassed the safety actuation isolation signals to the containment isolation valves. These events were determined to be abnormal occurrences and reported to Congress in January 1979.

(2) Recent licensing reviews have required tests or analyses to show that containment purge or vent valves would shut without degrading containment integrity during the dynamic loads of a design basis loss of coolant accident (DBA-LOCA).

The NRC position of the November 1978 letter requested that licensees take the following positive actions pending completion of the NRC review: (1) prohibit the override or bypass of any safety actuation signal which would affect another safety actuation signal; the NRC Office of Inspection and Enforcement would verify that administrative controls prevent improper manual defeat of safety actuation signals, and (2) cease purging (or venting) of containment or limit purging (or venting) to an absolute minimum, not to exceed 90 hours per year. Licensees were requested to demonstrate (by test or by test and analysis) that containment isolation valves would shut under postulated DBA-LOCA condition. The NRC positions were amplified by citation (and an attached copy) of our Standard Review Plan (SRP) 6.2.4 Revision 1 and the associated Branch Technical Position CSB 6-4, which have effectively classed the purge and vent valves as "active" invoking the oper

The NRC staff has made sit
licensees at Bethesda, Mar
many other licensees and m
discussions, the NRC staff
as noted above to assure t
in the event of a DBA-LOCA

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DUPLICATE DOCUMENT

Entire document previously entered into system under:

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No. of pages: 5

NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

November 14, 1979

Director of Nuclear Reactor Regulation
U S Nuclear Regulatory Commission
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket No. 50-282 License No. DPR-42
50-306 DPR-60

Demonstration of Containment
Purge Valve Operability

In a letter dated September 27, 1979 from Mr Darrell Eisenhut, Acting Director, Division of Operating Reactors, USNRC, we were provided with a document entitled, "Guidelines for Demonstration of Operability of Purge and Vent Valves." We were requested to initiate action on an expedited basis to ensure that containment vent and purge valves at Prairie Island meet these guidelines.

In a letter dated October 29, 1979 from Mr A Schwencer, Chief, Operating Reactors Branch #1, Division of Operating Reactors, USNRC, we were provided with a document entitled, "Interim Position for Containment Purge and Vent Valve Operation Pending Resolution of Isolation Valve Operability." We were requested to commit to operate in conformance with the interim position and provide information which demonstrates that we have initiated the purge and vent valve operability verification on an expedited basis. Our response was to be submitted in accordance with 10 CFR 50.54(f).

The following action has been taken to resolve the containment purge and vent valve operability questions discussed in these two letters:

a. As noted in our Licensee Event Report dated June 20, 1979 (79-019) and our letter dated July 10, 1979, we have placed administrative controls on our containment purge and vent valves. These valves will be closed whenever the reactor is above cold shutdown.

b. We have requested a proposal from the valve manufacturer, the Henry Pratt Company, to perform tests or analyses which demonstrate that the valves are capable of closing in the event a loss of coolant accident occurs while the containment is being purged. Valve modifications, if required, would be included in the scope of this work.

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cc: Jeff Off

c. Westinghouse Electric Corporation has completed an analysis which shows that ECCS system performance will be satisfactory in the event a loss of coolant accident occurs while the containment is being purged. This was submitted by NSP for NRC review on April 12, 1979.

In conformance with the NRC Staff's "Interim Position for Containment Purge and Vent Valve Operation Pending Resolution of Isolation Valve Operability", we will continue to keep purge and vent valves closed above cold shutdown. When the test and analysis program in item (b) above has been satisfactorily completed, we will resume purge and vent operations during normal plant operation, limiting all purging and venting times to as low as achievable in accordance with the NRC Staff's interim position. We will work with the valve manufacturer to assure that tests and analyses performed to assure adequacy of the valves will meet with NRC approval. This may require discussions with the Staff and valve manufacturer to resolve potential difficulties with the Staff's guidelines for demonstration of valve operability.

Please contact us if you have any questions related to the information we have provided.

L. O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/DMM/ak

cc: J G Keppler
G Charnoff

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

Docket No. 50-282
50-306

License No. DPR-42
DPR-60

LETTER DATED NOVEMBER 14, 1979
RESPONDING TO NRC REQUEST
FOR INFORMATION ON THE DEMONSTRATION OF
CONTAINMENT PURGE VALVE OPERABILITY

Northern States Power Company, a Minnesota corporation, by this letter dated November 14, 1979 hereby submits a response to the NRC request dated October 29, 1979 for information on the demonstration of containment purge valve operability.

This response contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By L. J. Wachter
L J Wachter
Vice President, Power Production
& System Operation

On this 14th day of November, 1979, before me a notary public in and for said County, personally appeared L J Wachter, Vice President, Power Production and System Operation, 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 [illegible] and that it is not interposed for delay.

Jeanne M Hacker
Jeanne M Hacker
Notary Public - Minnesota
Hennepin County
My Commission Expires May 6, 1986

JEANNE M. HACKER
NOTARY PUBLIC - MINNESOTA
HENNEPIN COUNTY
My Commission Expires [illegible]