Northern States Power Company

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Minneapolis, Minnesota 55401
Telephone (612) 330-5500

April 30, 1982

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Response to Request for Additional Information Related to Containment Purge and Vent System Isolation Valves

In a letter dated March 8, 1982 from Mr Robert A Clark, Chief, Operating Reactors Branch #3, Division of Licensing, USNRC, we were requested to provide information required by the NRC Staff's long-term review of the Prairie Island containment purge and vent isolation valves. The purpose of this letter is to provide the information needed to resolve this issue.

The requested information is provided in the attachment to this letter. Please contact us if you have any questions related to the information we have provided or the commitments we have made.

L.O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/DMM/bd

cc: Regional Administrator-III
NRR Project Manager, NRC
Resident Inspector, NRC
G Charnoff

Attachments

A001
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1/1

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

IN'ORMATION REQUIRED FOR CONTAINMENT PURGE
AND VENT VALVE LONG-TERM NRC STAFF REVIEW

The status of our long-term review of the above items for the Prairie Island Nuclear Generating Plant Units 1 and 2 is as follows:

1. Conformance to Standard Review Plan Section 6.2.4 Revision 1 and Branch Technical Position CSB 6-4 Revision 1

   In order that we may complete our safety evaluation on this issue, the following items need to be resolved.

   (a) Commit to the installation of debris screens in the purge supply and exhaust lines that meet the requirements described in Enclosure 2. You are also requested to provide an installation schedule for the debris screens for Units 1 and 2.

   (b) Commit to limit the use of the purge system to a specified annual time that is commensurate with identified safety needs. By letter dated December 3, 1981 you committed that when purge and vent operation is resumed it would be on an "as low as achievable" basis pending completion of the long-term review of other issues. Thus you are requested to define "as low as achievable" in terms of approximate hours per annum based on past safety needs.

   (c) Propose a Technical Specification to require that you perform leakage integrity tests of the isolation valves in the containment purge lines at least once every three months. The proposed technical specification applies to the isolation valves in the low volume purge system since you have committed by letter dated December 3, 1981 not to use the high volume purge system when the reactor is above cold shutdown condition. The proposed technical specifications are also to include a provision that the resilient seals of the isolation valves in the high volume purge and vent system will be protected against the exposure of the containment atmosphere when the reactor is above cold shutdown. If this provision cannot be met then high volume purge and vent system will be leak tested at least once every six months. If however the resilient seals of the high volume purge are protected, then by a proposed technical specification, we will require leak testing of the high volume purge system as a prerequisite to bring the reactor above cold shutdown provided that the high volume purge was used during the shutdown period. Leak testing is to include the isolation valves as well as the protective devices for the resilient seals.

2. Valve Operability

   Your letter of December 3, 1981 transmitted the Henry Pratt Company analysis of the purge valves at the Prairie Island Nuclear Generating Plant Units 1 and 2. This analysis is currently being reviewed by the staff and additional input is not required at this time.

3. Safety Actuation Override

Your letters of January 5, 1979, April 12, 1979, March 17, 1980, June 3, 1980, November 7, 1980 and May 6, 1981 addressed the issue of the safety actuation override at the Prairie Island Nuclear Generating Plant Units 1 and 2. This is under review by the staff and additional information is not required at this time. It is noted that a somewhat parallel review of engineered safety features resent is being carried out in conjunction with I&E Bulletin 80-06. That review will be handled separately outside the framework of the purge and vent review.

4. Containment Leakage Due to Seal Deterioration

A recently developed sample technical specification is provided for your consideration as Enclosure 3. We request that you review existing TSs against the sample provided herein. In addition we request that you submit the details of your proposed leak rate test program together with the TS change incorporating the test requirement (1(c) above).

RESPONSE

1(a) Debris screens will be installed in each 18-inch containment purge and vent line whenever the system is in use. The debris screens will be designed in accordance with the guidelines provided in Enclosure (2) to Mr Clark's March 8, 1982 letter. Refer to Figure (1).

The 36-inch purge and vent system penetrations for each unit will be sealed off with double-gasketed covers when the associated unit is above cold shutdown. The system will only be used during outages. Debris screens will not be required.

1(b) The 18-inch purge system will be used on an "as low as achievable" basis. We do not expect to use the system when above cold shutdown for periods of more than 90 hours total per calendar year per unit. The system is not normally required to maintain acceptable temperature, pressure, or humidity in containment. The 36-inch purge system will not be used above cold shutdown.

1(c) Double-gasketed covers will be installed on the containment side of all 18-inch and 36-inch containment purge and vent system penetrations. These covers will be removed on the 36-inch only when the associated unit is in cold or refueling shutdown. Covers on the 18-inch system will be removed immediately prior to using the system.

This modification will provide a barrier to leakage via these penetrations. The flanges will be subject to Type B local leakage tests following removal and replacement and at other intervals specified in 10 CFR Part 50, Appendix J. Valve leakage tests will be conducted prior to or immediately following removing penetration covers when using the 18-inch system above cold shutdown.

Appropriate Technical Specification changes will be submitted within 90 days of receipt of the NRC Staff's Safety Evaluation Report related to this issue.

The modification to the 36-inch system is scheduled for the next refueling outage of each unit. Modification of the 18-inch system is scheduled for the 1982 Unit 1 outage and the 1983 Unit 2 outage.

2. Following NRC Staff review of the Henry Pratt Company stress analysis of the Prairie Island 18-inch inservice purge system butterfly valves, a question arose concerning the stress analysis for the actuator bolts.

   Corrected pages for Attachment (2) of our December 3, 1981 report are attached.

3. No additional information is required for this item.

4. A Technical Specification change request will be submitted as noted in the response to 1.A(c) above.

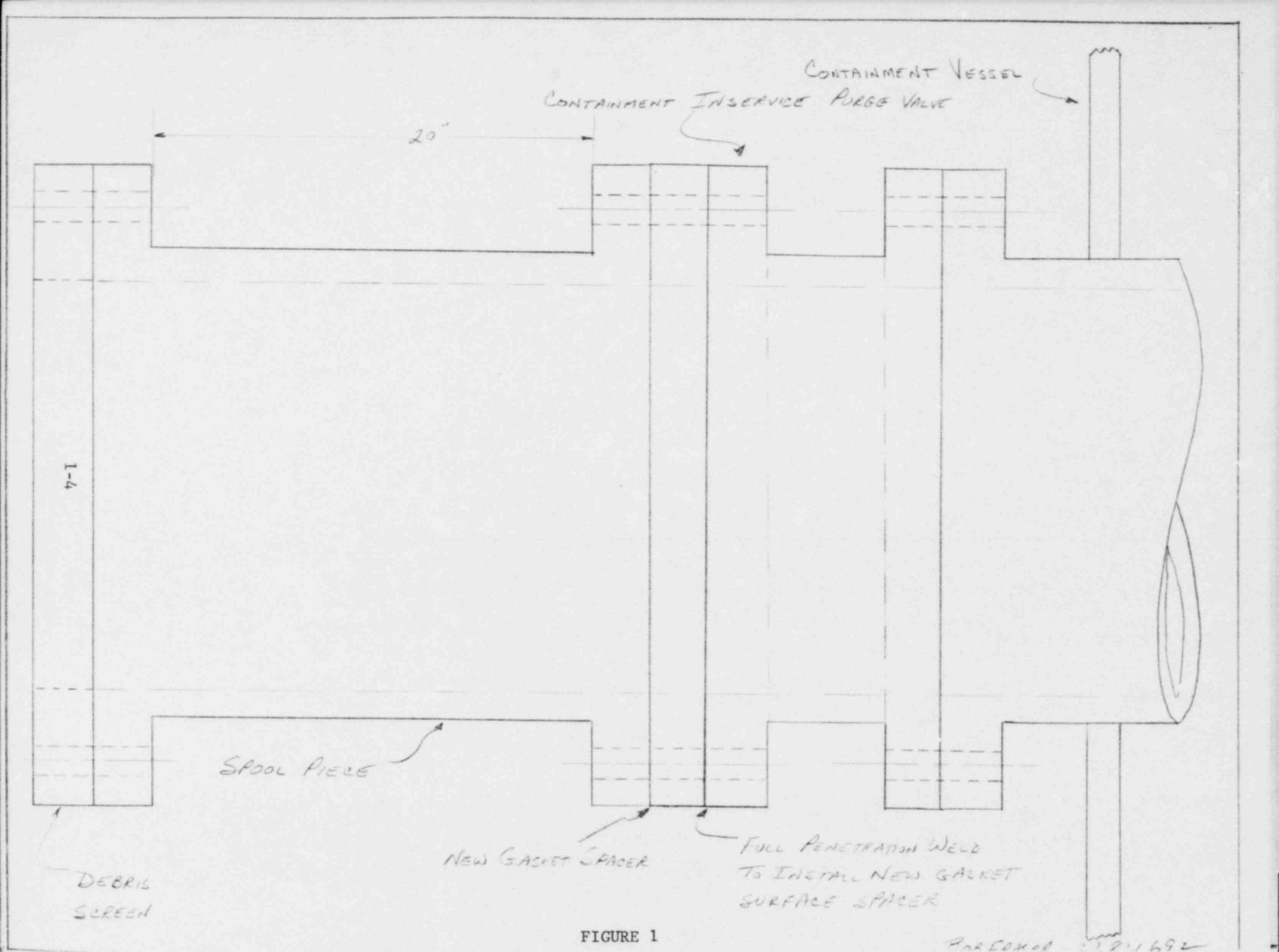
CONTAINMENT VESSEL
CONTAINMENT INSERVICE PURGE VALVE
20"
1-4
SPOOL PIECE
DEBRIS SCREEN
NEW GASKET SPACER
FULL PENETRATION WELD TO INSTALL NEW GASKET SURFACE SPACER

FIGURE 1

PRATT

HENRY PRATT COMPANY

401 SOUTH HIGHLAND AVENUE · AURORA, ILLINOIS 60507

April 26, 1982

Mr. Gary Miller
Prairie Island Nuclear Generating Station
Route #2
Welsh, Minnesota 55089

SUBJECT: Purge Valve Analysis for 18".Pratt Valves with Bettis Actuators
Customer P. O. : MQ-05174
Pratt Order No: D-029253-2

Dear Mr. Miller:

Per our telephone conversation, attached you will find corrected pages 2, 16, 17, 18, and 19 of attachment #2 of the subject report.

Very truly yours,

T. J. Wrona

T. J. WRONA
Manager,
Contract & Proposal Engineering

TJW:pst

CC: R. D. Nelson

SUMMARY OF RESULTS

VALVE COMPONENTS

COMPONENT	LOAD CONDITION	ANALYSIS REF. PAGE	STRESS LEVEL	ALLOWABLE STRESSES
Body-Trunnion	Operating load + Seismic load	11	1215	21,960
Disc	Op. Load + Seismic load	13	10,199.53	24,000
Stem	Op. Load + Seismic load	15	16932	24,000
Pin	Op. Load + Seismic load	16	10967	16200
Bearings	Op. load + Seismic load	17	1857.15	2000
Bolts	Op. load + Seismic load	19	18520.29	67,500

ANALYSIS OF BOLTS

CRITERIA:

Bolts are critical components from the stand-point of seismic analysis.

METHOD:

Considering the combined effect of seismic and direct loading, the max. load (P_2) carried by a bolt will be:

$$P_2 = \frac{(W)(L_y)(d_{12})}{\left[(d_{11})^2 + (d_{12})^2\right] N} + \frac{(W)(g_x)(L_y)(d_{12})}{\left[(d_{11})^2 + (d_{12})^2\right] N}$$

Where N = no. of bolts in row 2

Other Nomenclatures are shown in fig. 1.

Max. tensile stress (σ_t) in the bolt will be:

$$\sigma_t = \frac{P_2}{A_t \times N_1}$$

Where A_t = Stress area of the bolt, N_1 = NO. OF ROWS

Max. bearing stress (σ_b) on the threads will be:

$$\sigma_b = \frac{4 \cdot P_2}{\pi h (d_1^2 - d_2^2) n}$$

Where n = No. of threads per inch

h = Length of thread engagement

d_1 = dia. of bolt

d_2 = minor dia. of bolt

Max. shearing stress (τ_b) in the bolt will be:

$$\tau_b = \frac{P_s}{2(A_s)N_1}$$

Where P_s = Shear load

A_s = Area of bolt in shear

N_1 = No. of Rows

BOLTS

CALCULATIONS:

Type of bolt	1/2 - 13 NC	
Bolt Material	SAE - GR2	
No. of threads per inch (n) =	13	
Length of thread engagement (h) =	8125	inche
Dia. of bolt (d_1) =	0.5	inche
Minor dia. of bolt (d_2) =	0.4	inche
Tensile Area (At) =	0.1419	Sq. I
Shear Area (As) =	0.1257	Sq. I
From the fig. 1 Ly =	4.625	inche
d_{11} =	0.625	
d_{12} =	4.875	
No. of Rows (N_1) =	2	

$$P_2 = \frac{(W)(l_y)(d_{12})}{[(d_{11})^2 + (d_{12})^2]} N + \frac{(W)(g_x)(l_y)(d_{12})}{[(d_{11})^2 + (d_{12})^2]} N$$

$$= \frac{(776)(4.625)(4.875)}{[(0.625)^2 + (4.875)^2]2} + \frac{(776)(5)(4.625)(4.875)}{[(0.625)^2 + (4.875)^2]2}$$

$$= 2172.90 \text{ lbs.}$$

Max. Tensile Stress (σ_t) = $\frac{P_2}{2A_t} = \frac{2172.9}{2(.1419)}$

$$\approx 7656.45 \text{ psi}$$

Max. Bearing stress on threads (σ_b) = $\frac{4.\ P_2}{\pi h (d_1^2 - d_2^2) n}$

$$= \frac{(4)(2172.9)}{\pi(0.8125)[(.5)^2 - (.4)^2](13)}$$

$$= 2910.31 \text{ psi}$$

Max. Shear load (P_s) = W + W(gx)

$$= 776 + 776(5)$$

$$= 4656.00 \text{ lbs.}$$

Max. Shear Stress (τ_b) = $\frac{P_s}{2A_s}$

$$= \frac{4656}{2(.1257)}$$

$$= 18520.29 \text{ psi}$$

Allowable Stress Intensity 67,500 psi

Comment:

19.