NSP

Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East
Welch, Minnesota 55089

September 20, 1994

10 CFR Part 50
Section 50.55a(f)

U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

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

Response to the SER and TER for the 3rd 10-Year Inservice Testing (IST) Program and Submittal of Revision 3 of the 3rd 10-Year IST Program to the Requirements of ASME Section XI

This submittal is being provided to respond to the areas identified in NRC letters dated December 8, 1993 and March 15, 1994 and to revise the 3rd 10-Year Inservice Test Program. Three new Relief Requests (Nos. 17, 18 and 19) are attached, as well as revisions to the existing approved Relief Requests.

The IST Program was significantly revised after an independent review was performed and to respond to the items identified in the TER. "Guidelines for Inservice Testing at Nuclear Power Plants", NUREG-1482 was used significantly in the program revision. The attached program replaces the previous program submittal in its entirety.

Please contact Jack Leveille (612-388-1121, Ext. 4662) if you have any questions related to this submittal.

Michael D Wadley for
Roger O. Anderson
Director
Licensing and Management Issues

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
J E Silberg (w/o Attachment 2)
A S Jimenez (Hartford)
Bob Kubitschek (State of Minnesota)

Attachment 1: Inservice Testing Program Requests for Relief and Reply to NRC SERs/TER Letters Dated December 8, 1993 and March 15, 1994 (25 pages)

Attachment 2: Prairie Island Operations Manual Section H10.1, Rev. 3, ASME Section XI Inservice Testing Implementing Program

A047

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

INSERVICE TESTING PROGRAM REQUESTS FOR RELIEF

AND REPLY TO NRC SERs/TER LETTERS DATED DECEMBER 8, 1993

AND MARCH 15, 1994

1.0 INTRODUCTION

The purposes of this submittal are to provide a revision of the Prairie Island Nuclear Generating Plant 3rd 10-Year Inservice Testing (IST) Program, to request relief from the Code for additional components that cannot specifically be tested in a manner that meets the Code and to reply to NRC SERs/TER letters from the previous 3rd 10-year Inservice Testing Program submittals.

The IST Program, revision 3 is for Prairie Island's 3rd 10-year interval which started December 16, 1993 for Unit 1 and atarts December 21, 1994 for Unit 2. The 3rd 10-year IST Program is in compliance with ASME Boiler and Code Section XI, 1989 Edition, and Operations and Maintenance (OMa) Standards, Part 6 and Part 10, 1988. Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Test Programs" and NUREG-1482, Guidelines for Inservice Testing at Nuclear Power Plants" have been used in developing the IST Program.

This submittal is divided into four additional sections:

Section 2.0 New Requests for Relief Nos. 17, 18, and 19

Section 3.0 Update to Previously Submitted Requests for Relief

Section 4.0 Reply to Technical Evaluation Report Section 4.0 Items

Section 5.0 Reply to Technical Evaluation Report Section 5.0 Items

2.0 NEW REQUESTS FOR RELIEF NOS. 17, 18, AND 19

The independent review of the IST Program revealed the need for additional relief from the ASME Code pursuant to 10 CFR 50.55a Sections (a)(3)(i), (a)(3)(ii) or (f)(6)(i). Alternative testing which is proposed in the Relief Requests provides an equivalent level of quality and safety. The Relief Requests follow:

RELIEF REQUEST NO. 17

SYSTEM: Caustic Addition

COMPONENTS: CA-11-1, [2CA-11-1] Caustic Addition to Unit 1, [Unit 2] Containment Spray Pump Suction Check Valve (See Figure 1)

COMPONENT FUNCTION: The valve opens to allow flow of caustic solution from the caustic addition standpipe to the containment spray pump suction in the event of a containment spray actuation. The caustic solution is for pH adjustment of the containment spray boric acid solution.

The valve closes to prevent backflow of containment sump water to the caustic addition standpipe when on long term recirculation in the event of a passive failure of the downstream motor operated valve(s): MV32096, 97, [MV32108, 09]

CODE REQUIREMENTS: OM-10 paragraph 4.3.2 requires full stroke exercising of check valves to the position required for the valve to perform its safety function. Paragraph 4.3.2.4 allows an alternate to verification of valve obturator travel by performing disassembly and inspection of the valve every refueling to verify operability.

ALTERNATIVE TESTING:It is requested that the disassembly and inspection of CA-11-1 and 2CA-11-1 be extended to a 8 year frequency in lieu of disassembly every refueling. 2CA-11-1 will be disassembled and inspected during the Unit 2 spring 1995 refueling outage to reassure the position stated below on valve degradation is accurate.

Partial stroke exercising open and obturator travel to the closed position is tested on a quarterly frequency in accordance with OM-10 paragraph 4.3.2.2

BASIS FOR RELIEF: CA-11-1 and 2CA-11-1 are 4" stainless steel swing check valves located on the suction of the containment spray pumps. The valves are sized to minimize the flow restriction in the gravity drained caustic addition standpipe outlet piping. The design accident flow, approximately 70 gpm, is not sufficient to exercise the valve to the full open position. Engineering calculations show that approximately 300 gpm is required to fully open the valve.

It is not possible to test the obturator travel of CA-11-1 or 2CA-11-1 to the full open position quarterly, at cold shutdown or during refueling due to piping limitations in the sizes of vents and drains. The maximum flow estimated through the vent and drain piping is 5 gpm.

Disassembly and inspections of CA-11-1 and 2CA-11-1 performed to date (approximately 20 operating years) have shown no valve degradation or operability concerns. The most recent inspection on Unit 1 in the Summer of 1994 showed the valve to be in "like new" condition. The materials internal to

the valve are compatible with the fluid environment. Continued disassembly and inspection on a refueling frequency results in a hardship without a compensating increase in the level of quality or safety.

A search of the industry NPRDS data base has been performed to assess the reliability of this manufacturer and style of check valve. The search consisted of all 4" through 12" similar valves and revealed that there are no reported industry failures for this style of valve to fail to open. Failures that were reported relate to this style valve failing to close. Other failures reported were caused by service induced conditions such as corrosion or valve disc flutter. CA-11-1 and 2CA-11-1 are not susceptible to these failure mechanisms since the valve normally sits in the closed position and the valve materials are compatible with the fluid in the valve.

The installation of CA-11-1 and 2CA-11-1 have been reviewed addressing the "EPRI Applications Guidelines for Check Valves in Nuclear Power Plants". The results of the evaluation show that the valves are installed such that there are no valve problems generated due to the installation location.

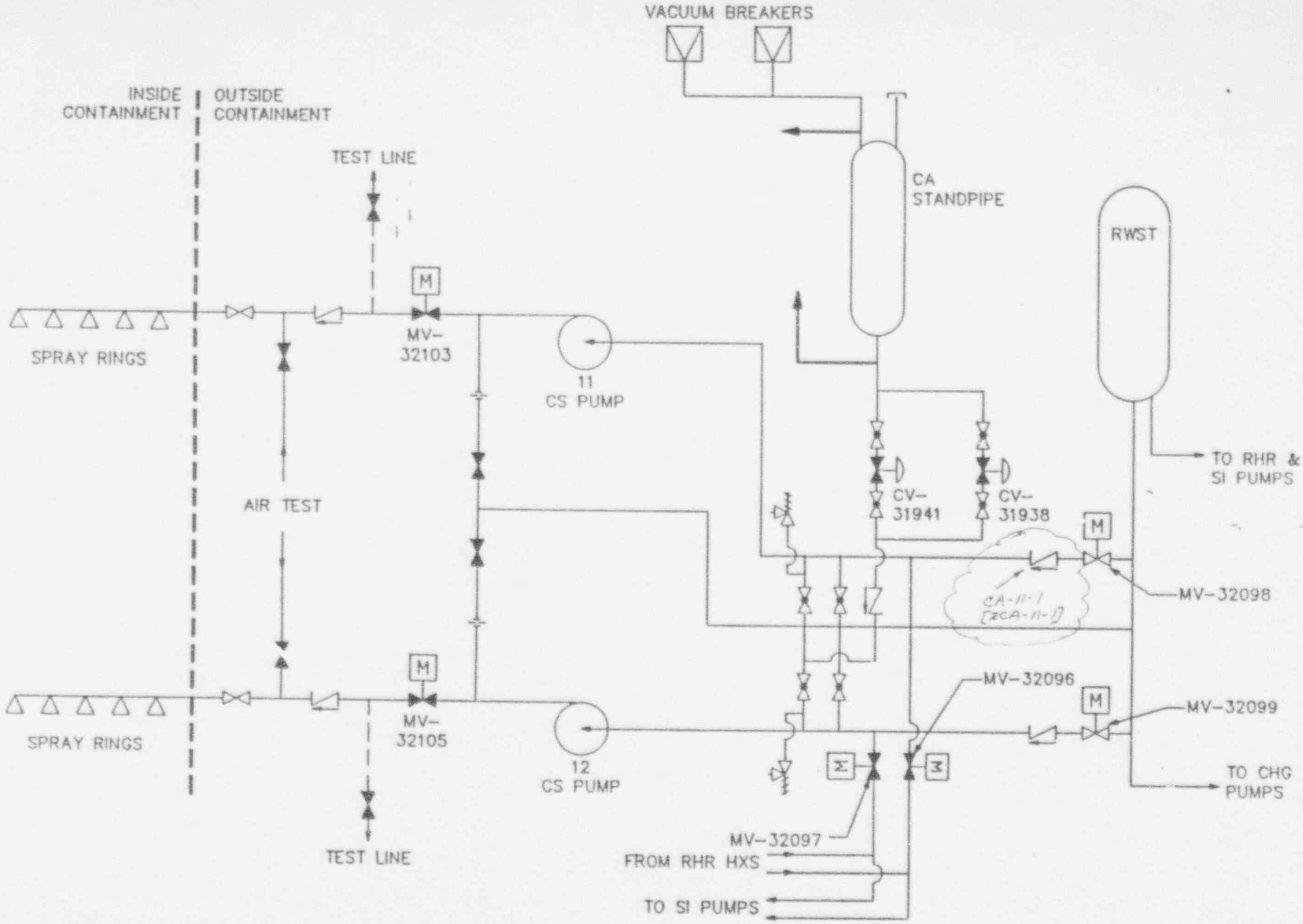
To allow disassembly and inspection of CA-11-1 or 2CA-11-1 it is necessary to isolate and drain the piping system. The caustic solution in the piping is slightly contaminated and has to be processed as radioactive waste. The caustic solution is not compatible with the waste treatment resins used at the plant and needs to be handled separately. Furthermore, handling the chemical is a burn hazard to the individuals working on the valve disassembly and the individuals draining the piping.

Due to the reduced inspection, the failure mode of concern that may go undetected is the failure to partially open to admit caustic solution to the suction of the containment spray pumps. Partial stroke exercising of CA-11-1 and 2CA-11-1 on a quarterly frequency mitigates some of this concern.

Offsite dose calculations have been performed, taking no credit for the caustic solution contribution to the partition coefficient in containment iodine scrubbing and fission product removal. The calculations show that 10CFR100 limits are not exceeded assuming no caustic addition or containment spray for fission product removal. The safety significance of CA-11-1 or 2CA-11-1 failing to function is limited. Failure of CA-11-1 or 2CA-11-1 to open does not prevent the containment spray system from performing its safety function of containment pressure reduction.

Additionally, piping qualification and equipment environmental qualification have been reviewed to assure there are no safety hazards in the event of a failure of CA-11-1 or 2CA-11-1 to open. Without the pH buffering of the caustic solution all piping remains below the stress levels required to initiate stress corrosion cracking and all required equipment remains environmentally qualified.

A review of the plant's level 2 Probabilistic Risk Assessment (PRA), which satisfies the Individual Plant Examination (IPE) requirements, was performed to assess the relative risk of CA-11-1 or 2CA-11-1 not functioning. It was found that these check valves were not modeled in the PRA and failure to open has no affect on the plant's core damage frequency.



PRAIRIE ISLAND TRAINING CENTER RED WING, MINNESOTA	CONTAINMENT SPRAY SYSTEM	DRAWN BY: M. PEKARIK REVIEWED BY:	REVISION: 2 DATE: 7/20/89	B18D-1

Request for Relief #17
Figure 1

RELIEF REQUEST NO. 18

SYSTEM: Service Water

COMPONENTS: CL-43-2, CL-43-3 and 2CL-43-2; 12, 121 and 22 Safety Related Service Water Pump Discharge Check Valves. (See Figure 3)

COMPONENT FUNCTION: The valve opens to allow flow of service water from the inservice service water pumps to the plant service water system.

The valve closes to prevent backflow of service water through an idle service water pump.

CODE REQUIREMENTS: OM-10 paragraph 4.3.2 requires full stroke exercising of check valves to the position required for the valve to perform its safety function on a quarterly frequency. Paragraph 4.3.2.2 states, if full stroke exercising is not practicable on a quarterly frequency, partial stroke exercising may be performed quarterly with full stroke exercising being performed at cold shutdown. Sub-paragraphs of 4.3.2.2 allow testing during refueling outages only.

Further, NRC Staff Position 1, as stated in Generic Letter 89-04 on full flow testing of check valves is "A check valve's full-stroke to the open position may be verified by passing the maximum required accident condition flow through the valve. This is considered by the staff as an acceptable full-stroke. Any flow rate less than this will be considered a partial-stroke exercise."

ALTERNATIVE TESTING: CL-43-2, CL-43-3 and 2CL-43-2 will be partial-stroke exercised on a quarterly frequency and full-stroke exercised to the open position on a yearly basis. Full-stroke exercising will be performed during the period of the year when service water flow is at its nominal peak. The flow during the full stroke exercise will not necessarily be the accident condition flow, rather the flow will be the nominal maximum attainable flow at the peak of the seasonal flow changes. The full-stroke exercise flow will be greater than the minimum flow value to assure the valve is full open provided by the valve manufacturer.

BASIS FOR RELIEF: The service water system at Prairie Island is a shared system between the two Units. The service water system flow fluctuates based upon the heat load of the plant and the river water temperature during the year. When either Unit is shutdown the service water load and flow is significantly reduced making it impracticable to coordinate full-stroke exercising with the cold shutdown or refueling cycle of either Unit.

Since the system is shared, and the two Units are rarely shutdown at the same time, full-stroke exercising when both Units are shutdown does not comply with the Code intended test frequency.

To meet the intent of the Code for full-stroke exercising of the check valves, they will be full-stroke exercised on a yearly frequency.

It is not practicable to test the obturator travel of CL-43-2, CL-43-3 or 2CL-43-2 to the full open position, by passing the maximum accident flow, quarterly, at cold shutdown or at refueling due to system limitations associated with the plant heat load, seasonal service water temperature and piping limitations in the service water system.

The USAR design accident flow for the valves is 15,500 gpm which is based upon an accident on one Unit and the other Unit at hot shutdown, assuming worst case service water inlet temperatures. During the year this flow is rarely obtained due to river water temperatures less than the design river water temperature and due to plant heat loads less than the accident analysis heat loads.

The alternative to full-stroke exercising with the design accident flow is to test the valves with the maximum attainable flow when the plant heat load is at its operating peak and the river water temperature is at its seasonal peak, typically during July or August. This flow may not exceed the design accident flow but will exceed the minimum flow specified by the manufacturer (9000 gpm) to place the valve in the full open position.

The valve design, being a dual plate wafer check valve (See Figures 1 and 2), is fully open at flows significantly lower than the design accident flow. The flow required to fully open the valve is directly related to the spring force. The design of the valve utilizes the spring to assist in closing the valve (the spring is relatively weak when compared to the opening force). Any flow in excess of that required to fully open the valve only increases the pressure drop across the valve. The design accident flow for these valves is 70 percent greater than the minimum flow to verify the valve is full open. Testing of the valve at a flow significantly beyond the minimum flow provides no usable information relating to valve degradation. Testing of the obturator travel to the closed position, which is performed quarterly, provides the meaningful data as to the status of the valve internals.

Use of non-intrusive methods for valve full-stroke exercising have been reviewed. Due to the valve design, non-intrusive testing is of little value since there is no backstop for the discs to impact.

Industry NPRDS failure data has been reviewed for similar dual wafer check valves in sizes 16" to 24". The data shows that the majority of the failures are related to the valve failing to seat when subjected to reverse flow. There are no failures, listed in the data, of a valve failing to move to the full open position. Failures were reported that were attributed to wear of valve internal components. Typically, the wear was detectable via testing in the closed direction or via disassembly and inspection. Full-stroke exercising of the dual wafer check valves was not shown to be one of the methods for detecting valve failure.

The three valves listed above are in the plant check valve program. Inspection of the valves of the discharge of the diesel driven cooling water pumps has shown little degradation. The degradation observed was with the seating surfaces which would not be ascertainable by full flow testing. Inspection of

the valve on the discharge of the safeguards motor driven cooling water pump showed minor degradation. The degradation was greater than that of the other two valves because the valve is open during high flow demand periods of the year. Again, in this case full flow testing of the obturator to the full open position would not have detected the degradation. The frequency of inspection in the check valve program assures valve operability.

DUAL PLATE CHECK VALVE
CERTIFIED DRAWING INFORMATION SHEET

ITEM	QTY.	PART #	DESCRIPTION	MATERIAL
* 1	1	A11049-03-4371	BODY-MACHINED	SA 216 GR. WCB
* 2	2	12253-E0-43	PLATE-MACHINED	SA 216 GR. WCB
3	1	D03-H300G-22	SEAL	BUNA-N
▲ 4.1	1	10304-294-4	STOP PIN	SA 479 TYPE 316
▲ 4.2	1	10304-295-4	HINGE PIN	SA 479 TYPE 316
6	1 SET	11821-2 & 11821-2L	SPRING	316 S.ST.
* 7.1	2	8505-5-4	STOP PIN RETAINER	SA 479 TYPE 316 ALT.: SA 182 GR. F-316
* 7.2	2	8505-6-4	HINGE PIN RETAINER	SA 479 TYPE 316 ALT.: SA 182 GR. F-316
8.1	2	12385-2-04	BODY LUG BEARING	A 479 TYPE 316
8.2	2	12385-1-04	PLATE LUG BEARING	A 479 TYPE 316
9	3	[illegible]32-65-04	SPRING BEARING	A 479 TYPE 316
10	1		NAME PLATE	S.ST.
11	1		TAG PLATE	S.ST.

P-DENOTES RECOMMENDED SPARE PART
* - " PRESSURE RETAINING PART
▲ - " SAFETY RELATED PART

DRAWING DIMENSIONS & DESIGN INFORMATION

DIM. A	23 7/8"	SIZE 20 INCH
DIM. B	8 3/8"	CWP 285 PSI
DIM. C	18 3/4"	DESIGN TEMP. 100 ° F @ 285 PSI
DIM. D	1" - 8UN	FIG. NO. 15 SMF - 698
DIM. E	20"	MODEL D
DIM. F	3 1/4"	WEIGHT 540 LBS. (APPROX.)
DIM. G	9 1/2"	CV 12960
DIM. H	3 5/8"	QTY. 2
DIM. I	0.51"	HYDROSTATIC TESTS: BODY SHELL- 450, +15,-0 SEAT- 315, +10,-0 PSIG

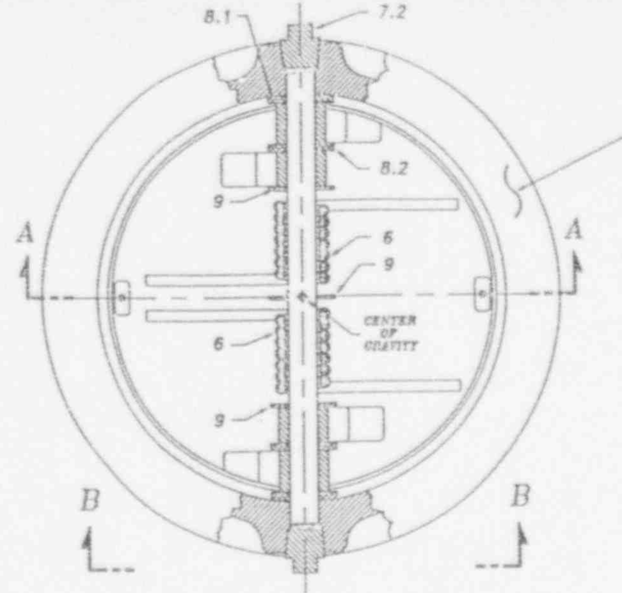
SEAT TEST PER CUST. REQUIREMENTS: 275 PSIG, 5 MIN. HOLD TIME

JOB INFORMATION

CUSTOMER: NORTHERN STATES POWER
CUST. P.O. NO.: E72417MQ, ITEM 3.
C&S SERIAL NO.S': 88-0341-03(Q)-01 &
88-0341-03(Q)-02

CODE REFERENCE

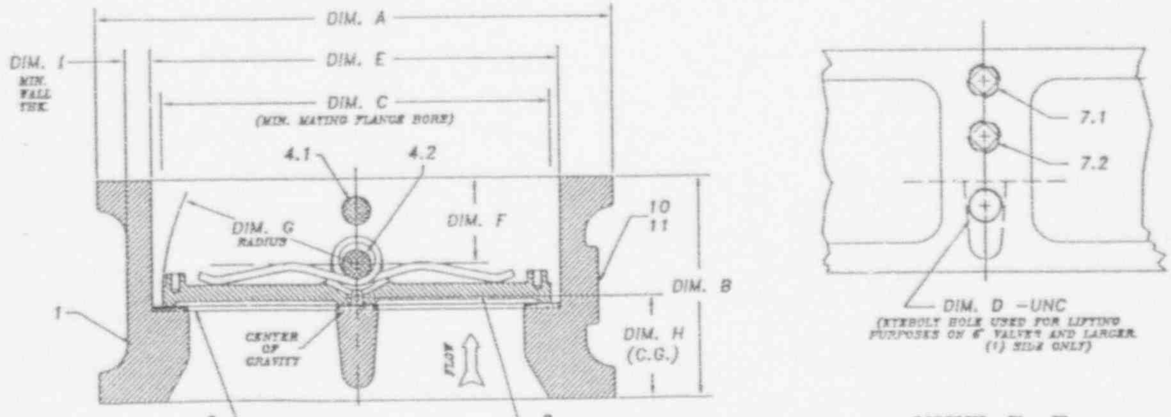
A.S.M.E. SECT. III, CLASS 3, 1980 EDITION, SUMMER 1982 ADDENDA.
(EXCEPT NO "N" STAMP IS REQUIRED.)



(32) SPIRAL OR CONCENTRIC SERRATIONS PER INCH (PER MSS-SP-6) .001-.006 DEEP, TYP. EA. FACE.

VALVE INSTALLATION REQUIREMENTS:

1. IN VERTICAL LINES, WITH UPWARD FLOW, GRAVITY WILL CLOSE VALVE.
2. IN HORIZONTAL LINES, INSTALL VALVE WITH HINGE PIN IN THE VERTICAL POSITION.
3. IF THE MEDIA VELOCITY EXCEEDS 8 FT./SEC. MAINTAIN A MINIMUM OF (5) PIPE DIAMETERS BETWEEN THE FLANGE AND THE UPSTREAM PIPE FITTINGS, TO AVOID DAMAGE TO VALVE, DUE TO TURBULENCE.

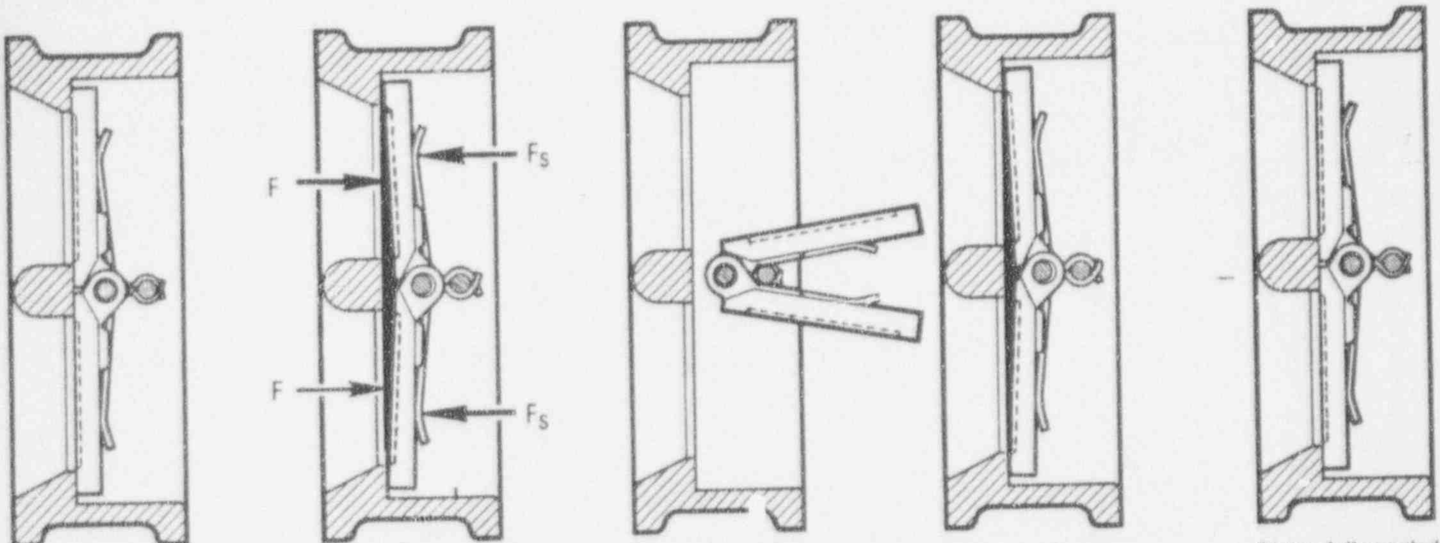


SECT. A-A

VIEW B-B

MATERIAL N/A	DO NOT SCALE DRAWING	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C&S VALVE COMPANY. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREIN, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT THE EXPRESS WRITTEN PERMISSION OF C&S VALVE COMPANY.		C&S VALVE COMPANY TRICENTRIC® DIVISION
HEAT TREAT N/A	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES			TITLE 20" CLASS 150 DUAL PLATE CHECK VALVE ASSEMBLY
QUANTITY	TOLERANCES DECIMAL ± .010 FRACTIONAL ± 1/8" ANGULAR ± 3°	DRAWN J.K.	DATE 12/5/88	
		CHECKED W. J. Allen	DATE 12-5-88	DWG.NO. 88-0341-03(Q)
SCALE N.T.S.	SURFACE FINISH N/A RMS REMOVE BURRS & SHARP EDGES	APPROVED [signature]	DATE 12/6/88	JOB NO. 88-0341(Q)

Request for Relief #18
Figure 1



The fluid develops a Resultant Force (F) which acts at the center of the area of sealed surface (0.424 radius). The point of Spring Force (F_s) acts beyond the center of area of each plate (1/2 to 3/4 radius). This fulcrum causes the heel to open first, preventing rubbing of the seal surface prior to normal plate opening. At closing, when the fluid flow decreases, the point of Spring Force causes the toe of the plate to close first.

Dual Water Check Valve Operation

Request for Relief #18
Figure 2

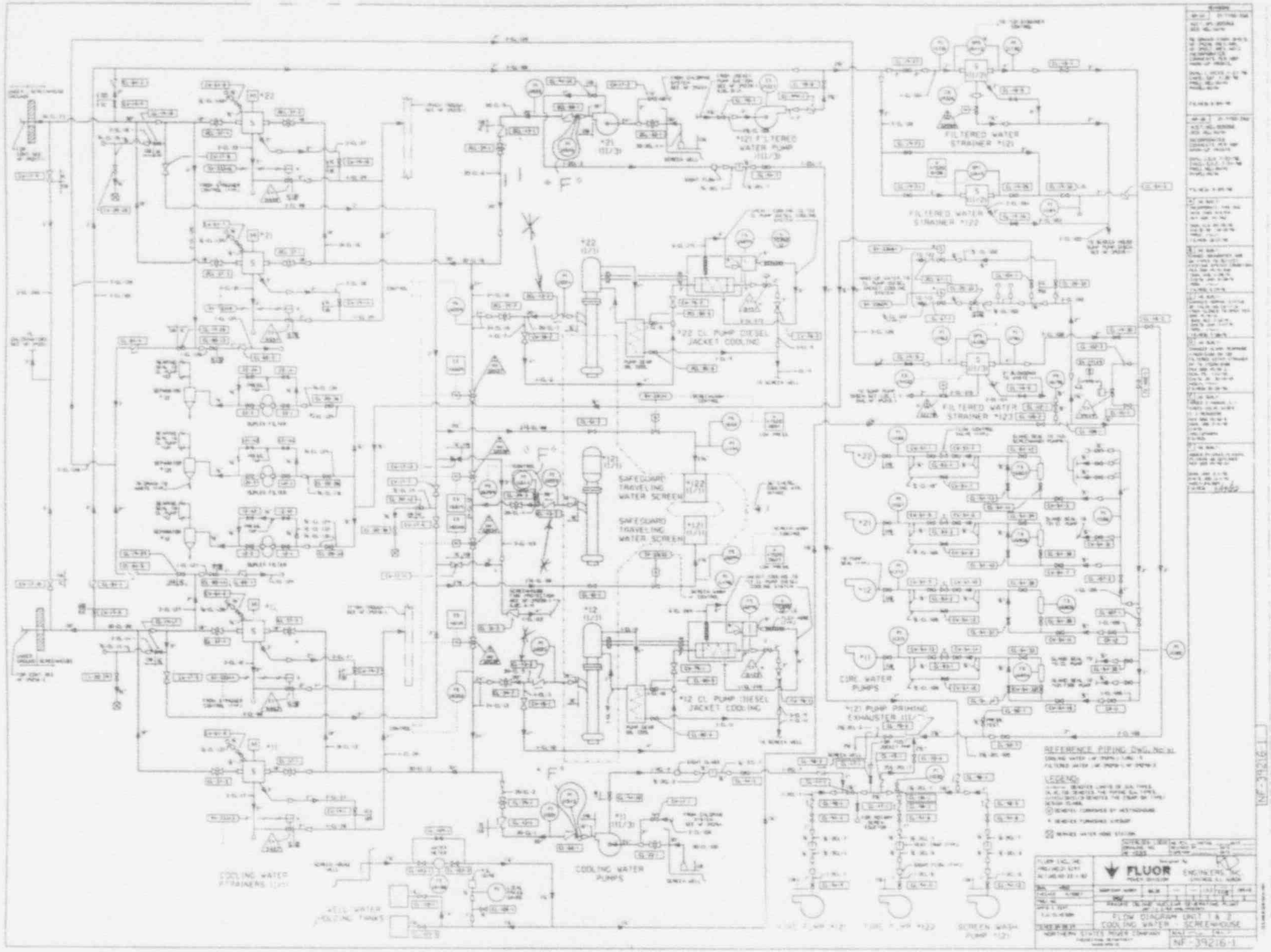


FIGURE 10.4-1a REV 10 12/91

Request for Relief #18
Figure 3

RELIEF REQUEST NO. 19

SYSTEM: Safeguards Chilled Water

COMPONENTS: 121 and 122 Safeguards Chilled Water Pumps.

COMPONENT FUNCTION: The safeguards chilled water pumps supply chilled water to the safeguards bus room air handlers and the control room air handlers for heat removal from the rooms.

CODE REQUIREMENTS: OM-6 paragraph 4.3 requires establishing reference values for flow or pressure that can be readily duplicated during subsequent testing for the purpose of trending pump degradation. Additionally, paragraph 5.2(b) requires that resistance of the system be varied until the flow rate equals the reference value prior to taking pressure readings.

ALTERNATIVE TESTING: As an alternative to a single reference value, reference pump curves will be used. Pump flow and differential pressure will be measured, then differential pressure will be plotted against flow to determine a "point" on the pump curve. This point is then compared to acceptance criteria based on Code allowable action ranges for centrifugal pumps.

The following elements are performed in preparing the pump curve:

(1) Pump curves are prepared when the pumps are known to be operating acceptably.

(2) When measuring the reference points for plotting or validating the curve, instruments at least as accurate as the Code, OMa 1988 Part 6 Table 1 will be used.

(3) Each curve will be constructed with a minimum of five points.

(4) The curve will be constructed using only those points beyond the "flat" portion (low flow rates) of the curve in a range which includes or is as close as practicable to design basis flow rates.

(5) Acceptance criteria for the pumps will be established such as not to conflict with the operability criteria for flow rate and differential pressure in the USAR.

(6) If vibration levels vary significantly over the range of the pump curve a method will be prepared to assign appropriate vibration acceptance criteria for regions of the pump curve.

(7) When the reference curves may have been affected by repair, replacement or routine service, a new reference curve will be plotted or the previous curve revalidated by conducting an inservice test.

BASIS FOR RELIEF: It is not possible to test 121 or 122 safeguards chilled water pumps at a single reference value due to the operational limitations of the chilled water system. Flow within the system is constantly changing due to temperature control valves in the system that are continuously repositioning due to changes in heat loads in the serviced rooms. It is not desirable to adjust the flow to a known reference value because the pump discharge valve, which would be used for the adjustment, is a gate valve which is not designed for throttle applications.

3.0 UPDATE TO PREVIOUSLY SUBMITTED REQUESTS FOR RELIEF

This section of the submittal updates the status of Relief Requests that were granted for an interim one year period. Relief Requests that were fully approved and not requiring any response by NSP are not being addressed here and are being implemented as stated in the approval document.

3.1 Unit 1 and Unit 2 Relief Request No. 1, Safety Injection Pumps 11, 12, 21, 22; Containment Spray Pumps 11, 12, 21, 22; Component Cooling Pumps 11, 12, 21, 22; Diesel Driven Cooling Water Pumps 12, 22.

Relief Request: Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6, Table 3 which requires vibration alert limits for centrifugal pumps to be >2.5Vr to 6Vr or >0.325 in/sec. The proposed alternate alert limit will be set at Vr + 0.2 in/sec.

Evaluation: Vibration trends have been reviewed for the safety injection, containment spray and component cooling pumps. It appears that some of the data scatter and occurrences of "Alert" levels can be attributed to the use of the "stinger" tip extension at the end of the hand held vibration velocity transducer. This can be susceptible to variations in data taking techniques such as hand pressure and orientation angle. A magnetic attachment for the transducer will be used for future readings to provide more accurate and consistent data.

A modification has been performed to replace the coupling between the engine and the right angle drive gear on the diesel driven cooling water pumps with one that has much more torsional resilience. The torsional vibration analysis calculations show that the new coupling will result in significantly lower stresses, however, certain torsional resonances from the engine will still be present in the system. The new coupling has successfully reduced the overall vibration in the system.

Relief Request Status: Relief Request No. 1 is being withdrawn in its entirety and the vibration limits specified in OM-6 Table 3 are being implemented.

3.2 Unit 1 and Unit 2 Relief Request No. 2, Component Cooling Pumps 11, 12, 21, 22

Relief Request:Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6, paragraph 4.6.1.1 and Table 1 which require that flow instrumentation be accurate within ±2% on full scale.

Evaluation: The required instrumentation used for flow measurement when testing the component cooling pumps has been changed to instrumentation that meets the Code requirements. The uncertainty associated with the control board flow indicator was the largest contributor to the instrument loop uncertainty. The control board flow indicator is no longer used for testing the component

cooling pumps. Flow measurements are obtained by using the plant emergency response computer system which provides accuracies within the Code allowable range.

Relief Request Status: Relief Request No. 2 is being withdrawn it its entirety and the instrument accuracy limits specified in OM-6, paragraph 4.6.1.1 and Table 1 are being implemented.

3.3 Unit 1 and Unit 2 Relief Request No. 4, Diesel Driven Cooling Water Pumps (DDCWPs) 12, 22; Motor Driven Cooling Water Pump (MDCWP) 121; Residual Heat Removal Pumps 11, 12, 21, 22.

Relief Request: Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6, paragraph 4.6.4(b) which requires vibration measurements on vertical line shaft pumps to be taken on the upper motor bearing housing in three orthogonal directions, one of which is in the axial direction.

Evaluation: This Relief Request was approved by the NRC, however, certain clarifications would assist in understanding the test methodology. The description of the RHR pumps as contained in the original Relief Request is satisfactory, i.e., two radial orthogonal vibration readings will be taken on the upper motor bearing but an axial vibration reading will not be taken.

There is not a need to include 121 MDCWP in Relief Request No. 4 since the testing on this pump is in full compliance with the Code requirements, including measurement of axial vibration.

12 and 22 DDCWPs are not motor driven, rather they are each driven by a diesel engine rated at 1215 horsepower through a right-angle gear drive, with a 41.5 foot vertical line shaft between the bottom of the right angle gear and the top of the pump impeller. These pumps have a design point of 13,000 gpm at approximately 100 psig. This type of pump is clearly outside of the range of power plant pump designs considered in developing the vibration criteria of ASME/ANSI Oma-1988, Part 6. The Code is based on all nuclear power plant pumps being ISO 2372, Annex "Class III" machines. The DDCWPs are ISO 2372 "Class V" machines (reciprocating). The pump itself is under water and is inaccessible for direct vibration measurements.

The output shaft of the right angle gear has been judged to be the most appropriate location for monitoring the pump drive shaft. The base flange of the right angle gear housing is the location at which vibration measurements are taken. The vibration from the gear output shaft (connected to the pump line shaft) is transmitted to this location via the lower bearing of the gear. Vibration measurements are taken in three orthogonal directions on the gear base flange.

Relief Request Status: The applicability of Relief Request No.4 is for only the RHR pumps. Testing of 121 Motor Driven Cooling Water Pump is in full compliance with the code and no relief is needed. The testing methods used on the diesel cooling water pumps are judged to meet a Code equivalent method and, therefore, relief is not needed for the diesel driven cooling water

pumps. The test methods for the diesel driven cooling water pumps is described in the IST Program.

3.4 Unit 1 and Unit 2 Relief Request No. 5, Diesel Driven Cooling Water Pumps 12, 22; Motor Driven Cooling Water Pump 121.

Relief Request: Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6, paragraph 5.2(b), which requires the resistance of a system to be varied until the flowrate or pressure equals the reference value, and Table 3b, which requires the differential pressure Alert range to be 0.93Pr to <0.95Pr and Required Action range to be <0.93Pr or >1.10Pr.

Evaluation: Reference pump curves have been developed for the cooling water pumps using the methods prescribed in the Relief Request. Acceptance criteria contained in Table 3b of OM-6 is being used. To date vibration levels have not varied significantly over the pump curve, hence, only one set of reference vibration acceptance criteria is used. As experience with testing is gained, a method for the use of specific vibration acceptance for regions of the curves may be developed.

Relief Request Nos. 15 and 16 have been submitted and approved for the small portion of the system flow that is not measured. Procedure changes have been implemented to isolate components that can be isolated during the performance of the Code testing to minimize the impact of the unmonitored flow on the testing. Actions are being taken to assure the unmonitored flow is a constant flow.

Relief Request Status: Only the portions of the Relief Request relating to the use of reference curves have been implemented. Acceptance criteria for the testing is in full compliance with the Code.

Note:Relief Requests Nos. 6 through 9 are not used.

3.5 Unit 1 Relief Request No. 10, Containment Spray Pumps 11, 12.

Relief Request: Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6, paragraph 5.2 which requires measurement of flowrate on a quarterly basis.

Evaluation: Flow measuring instrumentation has been installed on the recirculation line of 11 and 12 containment spray pumps. The instrumentation meets the Code requirements for accuracy and range. Testing of the containment spray pumps is in full compliance with the Code and GL 89-04.

Relief Request Status: Since this Relief Request was only for an interim bases until the appropriate test instrumentation was installed, and the instrumentation is now installed, the Relief Request is withdrawn in its entirety.

3.6 Unit 1 and Unit 2 Relief Request No. 11, Diesel Driven Cooling Water Pumps 12, 22; Motor Driven Cooling Water Pump 121.

Relief Request: Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6, paragraph 4.6.2.2 which specifies that, when determining differential pressure across a pump, a differential pressure gauge, a differential pressure transmitter that provides direct measurement of pressure difference, of a difference between the pressure at a point in the inlet pipe and the pressure at a point in the discharge pipe may be used. Prairie Island will use pump bay level to calculate inlet pressure which then allows the determination of pump differential pressure. This calculational technique yields an accuracy which meets the Code requirements.

Evaluation: Calculations are being made using inlet bay level to allow the determination of pump differential pressure. The calculation methods are in the surveillance procedure for the pumps.

Relief Request Status: The use of pump bay level and a calculational method for determining inlet pressure for the cooling water pumps is in full compliance with the Code and NUREG-1482 paragraph 5.5.3. Relief Request No. 11 is being withdrawn in its entirety.

3.7 Unit 1 and Unit 2 Relief Request No. 13, Safety Injection Pumps 11, 12, 21, 22.

Relief Request: Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6 paragraph 4.6.5 which requires use of flow measuring devices on pump test circuits.

Evaluation: Test procedures have been established that measure the full flow of the safety injection pumps on a refueling frequency. The recirculation flow is isolated and full pump flow is measured. Flow through the recirculation line is not measured during the quarterly pump testing. The recirculation line is a fixed resistance and flow does not vary. The testing performed on the safety injection pumps is consistent with position 9 in GL 89-04. Inspections of the flow orifice will be periodically performed to assure the flow is not changing.

Relief Request Status: Testing of the safety injection pumps is in full compliance with GL 89-04 position 9 and Relief Request No. 13 is being withdrawn in its entirety.

3.8 Unit 1 and Unit 2 Relief Request No. 14, Auxiliary Feedwater Pumps 11, 12, 21, 22.

Relief Request: Prairie Island requests relief from ASME/ANSI OMa-1988, Part 6 paragraph 4.6.5 which requires use of flow measuring devices on pump test circuits.

Evaluation: Test procedures have been established that measure the full flow

of the auxiliary feedwater pumps on a refueling frequency. The recirculation flow is isolated and full pump flow is measured. Flow through the recirculation line is not measured during the quarterly pump testing. The recirculation line is a fixed resistance and flow does not vary. The testing preformed on the auxiliary feedwater pumps is consistent with position 9 in GL 89-04. Inspections of the flow orifice will be periodically performed to assure the flow is not changing.

Relief Request Status: Testing of the auxiliary feedwater pumps is in full compliance with GL 89-04 position 9 and Relief Request No. 14 is being withdrawn in its entirety.

3.9 Unit 1 and Unit 2 Relief Request No. 15, Diesel Driven Cooling Water Pumps 12, 22.

Relief Request: Prairie Island has requested relief from ASME/ANSI OMa-1988, Part 6 paragraph 4.6.5 which specifies that, when measuring flow rate, a rate or quantity meter installed on the pump test circuit is to be used.

Evaluation: The unmetered cooling water flow to the jacket cooling water system is the flow most likely to change due to a change in the recirculation line resistance. The mechanism most likely to change the resistance is fouling of the diesel engine heat exchanger or the gear oil cooler. Fouling of these heat exchangers would have a very small impact on the total flow in the system. The fouling would tend to force the test data to a location higher on the pump curve due to a lower unmetered flow. This effect is judged to be very small and does not warrant changing the pump acceptance criteria. The gear oil cooler and the diesel jacket water heat exchanger are cleaned on a periodic basis to assure sufficient transfer heat transfer from the diesel engine and from the right angle drive gear. This cleaning also returns the flow resistance to its "clean" value, assuring pump testing that is repeatable. Further, since the unmetered flow is significantly less than the metered flow, any change in the unmetered flow has very little impact on the total flow being measured. (A 50% change in the unmetered flow is less than 1/2% change in the total metered flow.)

Plant experience has shown that the cooling water system is not prone to erosion type degradation which would cause the resistance in the unmetered lines to reduce and unmetered flow to increase. Any resistance in unmetered lines is anticipated to increase, thus reducing the unmetered flow. Trending of system hydraulic parameters is not likely to detect a reduction of unmetered flow. Changes in flow to the chemical treatment or filtered water systems would be detected by other methods such as chemical sampling of the cooling water system or low flow alarms to various pump seals. The filtered water strainers are self cleaning assuring the flow through the strainers 's constant.

Finally, the cooling water pumps are vertical line shaft pumps. Acceptance criteria for these pumps is already more strict than that for other centrifugal pumps. The use of Alert Range values assures early assessment of any indication of pump degradation. The acceptance criteria being used still provides margin above the USAR minimum flow and pressure requirements.

Relief Request Status: The effects of a change in the unmetered flow on the cooling water pump testing have been determined to be negligible. The unmetered flow is a very small portion of the total flow. Procedures are in place to assure heat exchangers in the unmetered lines are cleaned, thus assuring the unmetered flow is approximately constant. Changes in unmetered flow can be detected by methods other than pump testing and assured to be approximately constant. Relief Request No. 15 is being implemented with no adjustment to the acceptance criteria for the test.

3.10 Unit 1 and Unit 2 Relief Request No. 16, Motor Driven Cooling Water Pump 121.

Relief Request: Prairie Island has requested relief from ASME/ANSI OMa-1988, Part 6 paragraph 4.6.5 which specifies that, when measuring flow rate, a rate or quantity meter installed on the pump test circuit is to be used.

Evaluation: The effects of a change in the unmetered flow on 121 motor driven cooling water pump is negligible. A 50% change in the unmetered flow is less than 1/2% change in the total metered flow. The change in unmetered flow is not detectable using instruments that only meet the Code accuracy requirements.

Plant experience has shown that the cooling water system is not prone to erosion type degradation which would cause the resistance in the unmetered lines to reduce and unmetered flow to increase. Any resistance in unmetered lines is anticipated to increase, thus reducing the unmetered flow. Trending of system hydraulic parameters is not likely to detect a reduction of unmetered flow. Changes in flow to the chemical treatment or filtered water systems would be detected by other methods such as chemical sampling of the cooling water system or low flow alarms to various pump seals. The filtered water strainers are self cleaning assuring the flow through the strainers is constant.

Finally, the cooling water pumps are vertical line shaft pumps. Acceptance criteria for these pumps is already more strict than that for other centrifugal pumps. The use of Alert Range values assures early assessment of any indication of pump degradation. The acceptance criteria being used still provides margin above the USAR minimum flow and pressure requirements.

Relief Request Status: The effects of a change in the unmetered flow on the motor driven cooling water pump testing have been determined to be negligible. The unmetered flow is a very small portion of the total flow. Relief Request No. 16 is being implemented with no adjustment to the acceptance criteria for the test. Changes in the unmetered flow are detectable by means other than pump testing and therefore can be assured to be approximately constant.

4.0 REPLY TO TER SECTION 4.0 ITEMS

Section 4.0 Deferred Valve Testing Justifications Reply

This section of the response addresses the specific items in the Prairie Island Technical Evaluation Report (TER) dated November 4, 1993. The numbering scheme for items addressed are those used in the TER, for ease of referencing.

General Information

In response to the introduction section of TER Section 4.0, clarifications are provided in the revised IST Program document to resolve the identified items, specifically:

1. Valve specific testing requirements with regards to function, test type, and test frequency have been developed. Each of the test requirements is referenced to the specific OM-10 paragraph. These requirements can be found in both the Valve Tables and the IST Basis Document for the specific valves.

2. Deferrals justifying the impracticality of testing of valves in the specific open or closed direction have been developed and frequencies for each direction addressed separately. These changes can be found in the Deferral section of the IST Program document and in the Valve Tables.

3. Valve stroke exercising, whether partial stroke or full stroke, is defined in the Check Valve Table and in the IST Basis Document.

4. The use of terms for Code required testing of valves have been standardized by referencing the specific Code paragraph in the IST Basis document.

Table 4.1 Reply

Unless specifically addressed below, resolution of the comments in Table 4.1 "Evaluation of Licensee's Justification" can be found in the IST Basis Document and the Deferrals, both a part of the IST Program Document.

Item B-3

All valves listed under this item have been removed from the program. It has been determined that the valves serve no safety function since the installation of the hydrogen recombiners in containment. Prairie Island Safety Evaluation 358 justifies this position.

Item B-4

The MOV's referenced in this item are now tested at a quarterly frequency.

Item B-8

The MOV's referenced in this item are now tested at a quarterly frequency.

Item B-9

The MOV's referenced in this item are now tested at a quarterly frequency.

Item D-1

Valves SI-10-1, 2, [2SI-10-1, 2] are located downstream of the piping branch connection for the safety injection pump recirculation line. The line downstream of the check valve is pressurized to RCS pressure which is above the shutoff head of the safety injection pumps. See Deferral SI1 and SI2, [2SI1 and 2SI2].

Item E-1

Exercising of RH-6-1 [2RH-6-1] while performing the RHR pump test is not possible since the shutoff head of the RHR pumps is below the normal pressure in the letdown line. See Deferral RH3 [2RH3].

Item F-1

MV32120, 32121 [MV32122, 32123] are now tested on a quarterly frequency in accordance with OM-10. See Deferral CC3, CC14, [2CC3, 2CC14] which addresses the impracticality of testing MV32266, 32267 [MV32268, 32269] on a quarterly basis.

Item G-1

The status of the inservice purge valves is addressed in the IST Program Section 6.6, and the valves have been removed from the Valve Tables.

Item J-1

Manual valves AF-13-1 [2AF-13-1] are now full stroke exercised to both the open and closed position on a quarterly frequency.

Item K-1

CA-11-1 [2CA-11-1] is partial stroke exercised open quarterly, and the obturator travel to the closed position is also tested quarterly. See Deferral CA1 [2CA1] and Relief Request No. 18.

Item K-3

The valves referenced in this item are tested closed each cold shutdown. The IST Basis Document provides discussion on the verification of no safety function in the open direction.

Item K-5

The IST Program review showed that SM-10-1 [2SM-10-1] has no safety function in the closed or open direction. Prairie Island Safety Evaluation 251 and the Containment Isolation Design Basis Document provide justification for this position. It should be noted that SE 251 redefines the Code boundary for the suction of the charging pumps and hence revises the valves that are in the IST Program.

Item K-6

The Code boundaries for the suction of the charging pumps has been redefined in Prairie Island Safety Evaluation 251. VC-8-10 [2VC-8-10] and VC-8-11 [2VC-8-11] are no longer in the IST Program. The Code boundary on the suction of the charging pumps is now defined by VC-8-14, VC-8-15, VC-2-1, VC-2-2, VC-13-2 and VC-15-40 [2VC-8-14, 2VC-8-15, 2VC-2-1, 2VC-2-2, 2VC-13-2 and 2VC-15-40]. Refer to the IST Basis Document for discussion on the testing.

Item K-8A

The Code boundaries for the suction of the charging pumps has been redefined in Prairie Island Safety Evaluation 251. VC-13-1 [2VC-13-1] is no longer in the IST Program. The Code boundary on the suction of the charging pumps is now defined by VC-8-14, VC-8-15, VC-2-1, VC-2-2, VC-13-2 and VC-15-40 [2VC-8-14, 2VC-8-15, 2VC-2-1, 2VC-2-2, 2VC-13-2 and 2VC-15-40]. Refer to the IST Basis Document for discussion on the testing.

Item L-1

CC-23-1 [2CC-23-1] have been removed from the IST Program since it has been determined that this valve has no safety function. Reference Prairie Island Safety Evaluation 322.

Item L-6

CV31381, 31411 [CV31383, 31384] are being modified to allow performance of fail safe testing and full stroke exercising on a quarterly basis. The IST Basis Document reflects this change.

5.0 REPLY TO TER SECTION 5.0 ITEMS

Section 5.0 IST Program Recommended Action Items

This section of the response addresses the specific items in the Prairie Island Technical Evaluation Report (TER) dated November 4, 1993. The numbering scheme for items addressed are those used in the TER, for ease of referencing.

TER Section 5.1

Section 5.0 and 6.0 of the IST Program describe the methods used for IST Program component selection and program development. As stated in the revised program, pumps and valves in ASME Code classified systems that perform a specific function in shutting down the reactor to the hot shutdown condition were included. The required testing for each component was then derived from the OM-6, OM-10, or OM-1.

Fail safe testing is not specifically called out in the program because all valves with fail safe actuators are fail safe tested at the same time as the full stroke exercising required by the Code.

The Valve Tables have been revised and, when used with the IST Basis Document and the IST Deferrals, provide the detailed information to assure the test frequency is appropriate for both directions of testing. The Deferrals address justification for impracticality of testing in both directions when testing cannot be performed at the quarterly frequency.

Safety systems that are not classified as ASME Class 1, 2, or 3 and are not in the IST Program are tested and maintained commensurate with their importance to safety. These components are serviced, tested, inspected and maintained in accordance with the Preventive Maintenance Program and the Surveillance Program. It should be noted that the basis for these programs is a Reliability Centered Maintenance (RCM) approach.

The recent independent review of the IST Program assured that the scope of the program is complete. Reductions in the scope of the program require a safety evaluation. The safety evaluation process requires review for changes to the IST Program and assures the program is maintained current.

TER Section 5.2

The entire IST Program has been independently reviewed to assure the scope is in compliance with the Code. The IST Basis Document assures the required testing is performed commensurate with the safety function of the component as defined in the FSAR/USAR.

Reply to Sub-sections of 5.2

5.2.1 Paragraph 8.3 of the revised IST Program specifies the

requirements for valve position verification. All valves in the program which have remote position verification are position verified in accordance with OM-10 paragraph 4.1. The specific requirements for each valve are spelled out in the surveillance procedures.

5.2.2 Valves CF-11-1, 2 [2CF-11-1, 2] are now in the IST Program. Obturator travel to the closed position is tested on a quarterly frequency.

5.2.3 Valves AF-14-1, 3 [AF-14-5, 7] are now in the IST Program. Obturator travel to the closed position is tested on a quarterly frequency. The valves are partial-stroke exercised quarterly and full-stroke exercised at cold shutdown. See Deferrals AF1 and AF2 [2AF1 and 2AF2].

5.2.4 The function of valves CC-29-1, 2 have been reviewed to assure their safety function. The valves only have a safety function in the open direction. The component cooling system is a closed system within containment and the adjacent motor operated valves provide the containment isolation function. Reference Prairie Island Safety Evaluation 322. The IST Basis Document reflects this position.

5.2.5 Surge and overpressure protection devices have been included in the IST Program and are tested in accordance with OM-1. Sentinel type relief valves may later be removed from the program pending changes to the Code.

5.2.6 The functional requirements of MV32016 and MV32017 have been revised to reflect their safety function in both open and closed directions. The IST Basis Document reflects this change.

5.2.7 A review of the safety function of CV31432 and MV32088 has been performed. Neither valve has a safety function. These valves are not required to perform a specific function in shutting down the reactor to hot shutdown.

5.2.8 Valve CC-65-1 performs no safety function since the component cooling surge tank is continually vented to atmosphere via the overflow to the waste holdup tank. In the original plant design, prior to modifying the vent piping of the surge tank the vacuum breaker was functional.

5.2.9 The plant valve lineup is not maintained in accordance with the position of valves shown on the flow diagrams. Valve positions in the plant are controlled by the System Checklists. The previous revision of the IST Program would have reflected the position of the valves in the System Checklist.

The current revision of the IST Program corrects the discrepancies noted in this section of the TER, primarily by implementation of the IST Basis Document and the Deferrals for individual valves.

Drawing discrepancies highlighted in the TER are being corrected.

TER Section 5.3

Relief Request No. 1 has been withdrawn in its entirety. All testing is being performed using the acceptance criteria from OM-6. An update to the status of all Relief Requests is provided in Section 3 of this submittal.

TER Section 5.4

Relief Request No. 2 has been withdrawn in its entirety. Alternate instrumentation which meets the Code accuracy requirements is being used for flow measurements for the component cooling pumps.

TER Section 5.5

Relief Request No. 4 has been revised to only address the RHR pumps due to the domed configuration on the upper motor housing. The motor driven cooling water pump vibration measurement locations are now in compliance with the Code. The diesel driven cooling water pumps are outside of the range of nuclear power plant pump designs considered in developing OMa-1988, Part 6. The configuration is different than that considered in the Code. Prairie Island's position for vibration measurements on these pumps has been incorporated into the IST Program in Section 7.0. The elevated vibration levels associated with the diesel cooling water pumps was attributed to the design of the coupling between the diesel engine and the right angle drive. The coupling has since been modified and the vibration levels have been reduced significantly.

TER Section 5.6

Reference curves for the motor driven and diesel driven cooling water pumps have been established. Acceptance criteria in accordance with the Code is being used. To date vibration levels have not varied significantly over the pump curve, hence, only one set of reference vibration acceptance criteria is used. As experience with testing is gained, a method for the use of specific vibration acceptance for regions of the curves may be developed.

Relief Request Nos. 15 and 16 have been submitted and approved for the small portion of the system flow that is not measured. Procedure changes have been implemented to isolate components that can be isolated during the performance of the Code testing to minimize the impact of the unmonitored flow on the testing. Actions are being taken to assure the unmonitored flow is a constant flow.

TER Section 5.7

Modifications to the containment spray pump recirculation lines have been performed that installed a flow instrument that meets the Code requirements. Testing is now in full compliance with the Code and

position 9 of GL 89-04. Relief Request No. 10 has been withdrawn.

TER Section 5.8

Valve Tables have been revised to reflect the correct the sub-drawing in the drawing series. Revisions to drawings to reflect the appropriate drawing cross-referencing will be performed in the future. Drawing coordinates have been added to the IST Program Valve Tables where drawing coordinates exist.

TER Section 5.9

The flowrate of the safety injection pumps and the auxiliary feedwater pumps is not being measured quarterly. Initially, Relief Request Nos. 13 and 14 were submitted to permit testing in this manner. Subsequently, the Relief Requests are being withdrawn. The pumps are being full flow tested on a refueling frequency with the recirculation lines isolated and full flow is measured. The testing is in compliance with GL 89-04 position 9.

TER Section 5.10

The majority of the anomalies discussed in Section 5.10 are addressed in the response to TER Section 4.0. Those items not specifically addressed are covered in the revision to the IST Program, namely, in the development of the IST Basis Document and the individual Deferrals.