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AUTH.NAME AUTHOR AFFILIATION
MUSOLF,M. Northern States Power Co.
RECIP.NAME RECIPIENT AFFILIATION
Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards supplemental info re Addendum 1 to 801010 license amend request. Info in response to NRC concerns re scram discharge vol.

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Northern States Power Company

414 Nicollet Mall
Minneapolis, Minnesota 55401
Telephone (612) 330-5500

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

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Supplemental Information Concerning
Addendum No. 1 to
License Amendment Request dated October 10, 1980

The attached information is provided in response to concerns of the NRC Staff associated with Addendum No. 1 to License Amendment Request dated October 10, 1980. Attachment "A" explains how the newly designed Scram Discharge Volume conforms to the BWR Owners' Group criteria discussed in the NRC's December 9, 1980 Generic Safety Evaluation Report. Attachment "B" discusses the new level instrumentation in the Scram Discharge Volume and one minor change to page 34 of the Technical Specifications.

If further information is required, please contact us.

David Musolf
Manager of Nuclear Support Services

DMM/TMP/bd

cc: Regional Admin-III
NRR Project Manager, NRC
NRC Resident Inspector
G Charnoff
MPCA
Attn: J W Ferman

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ATTACHMENT A

RESPONSE TO SECTION 4.2 CRITERIA GIVEN IN THE GENERIC SAFETY EVALUATION REPORT (SER) REGARDING BWR SCRAM DISCHARGE SYSTEM DATED DECEMBER 1, 1980

Functional Criterion 1

The scram discharge volume shall have sufficient capacity to receive and contain water exhausted by a full reactor scram without adversely affecting control rod drive scram performance.

Response

The scram discharge system is comprised of two instrument volumes and their associated piping. The two systems, designated east side and west side, serve 60 CRD's and 61 CRD's, respectively. Assuming 3.34 gallons per drive, the systems have the capability of receiving a full reactor scram. The systems provide a scram volume margin of 96.75 gallons for the east side and 141.46 gallons for the west side. Volume available in instrument,vent, or drain lines is not utilized in these calculations. See Table 1.

Safety Criterion 1

No single active failure of a component or service function shall prevent a reactor scram under the most degraded conditions that are operationally acceptable.

Response

Redundant components in the scram discharge system assure that failure of a single valve, instrument, or other component will not prevent a reactor scram. No single intentional bypass, maintenance or calibration operation, or test to verify operational availability of the scram volume instrumentation will disable the scram discharge system. Partial loss of service functions (e.g., degraded control air pressure) will not adversely affect system function. Design Criterion 1 analyzes this case.

Safety Criterion 2

No single active failure shall prevent uncontrolled loss of reactor coolant.

Response

Two isolation valves in series are provided in all SDV vent and IV drain lines. To make these valves sufficiently independent, the four inboard valves are supplied air by one set of solenoids and the outboard valves by another set of solenoids. Hence, a single solenoid failure would not allow an uncontrolled loss of reactor coolant.

Safety Criterion 3

The scram discharge system instrumentation shall be designed to provide redundancy, to operate reliably under all conditions, and shall not be adversely affected by hydrodynamice forces or flow characteristics.

Response

With regard to single random failures, redundancy in the automatic scram level instrumentation has been provided for each instrument volume in accordance with Safety Criterion #1.

With respect to common-cause failures, diversity of level-sensing instrumentation has been provided. Both float type and thermally-actuated instruments have been employed in the design. For these types of instruments, common cause failures, such as those identified by operating history and those identified in the Foreword to IEEE 379-1977 have been considered, in that the thermally-actuated switches are not susceptible to the type of common cause failures previously experienced (crushed floats due to hydrodynamic forces). Furthermore, the instruments are designed, qualified, and installed to be immune from external environmental effects such as earthquakes; are subjected to separate design and manufacturing quality assurance programs from each supplier and are tested and maintained by qualified personnel using approved procedures subject to a quality assurance program.

Safety Criterion 4

System operating conditions which are required for scram shall be continuously monitored.

Response

Diverse and redundant instrumentation will be installed on each instrument volume to continuously monitor system operating conditions.

Safety Criterion 5

Repair, replacement, adjustment, or surveillance of any system component shall not require the scram function to be bypassed.

Response

Isolation valves for each scram level switch make it possible to isolate any single instrument for repair, replacement, adjustment, or surveillance without disabling the scram function. The alarm and rod block level instruments can also be isolated without disabling the scram function. Existing Technical Specification requirements for inoperable instrument channels will be implemented.

Operational Criterion (1)

Level instrumentation shall be designed to be maintained, tested, or calibrated during plant operation without causing a scram.

Response

The 1 out of 2 twice instrumentation scram logic and the individual level switch isolation capability permits maintenance, testing, and calibration of the level instrumentation without causing a scram.

Operational Criterion (2)

The system shall include sufficient supervisory instrumentation and alarms to permit surveillance of system operation.

Response

Each SDIV will be instrumented to initiate alarms to warn the operator of water accumulation in the instrument volume and of a control rod block prior to scram initiation.

Operational Criterion (3)

The system shall be designed to minimize the exposure of operating personnel to radiation.

Response

The system is designed to provide an unobstructed flow path from the CRD's to the SDIV's. The piping slopes toward the drain and increases in diameter at each transition as it approaches the instrument volume. No pockets exist to trap and hold contaminants. New materials are stainless steel. All of these factors reduce the probability of radio-active materials remaining in the discharge piping to create a source of radiation exposure.

Headers and large diameter piping in the system are fitted with blind flanges to facilitate use of a hydrolaser for cleaning.

All level instruments are flange-mounted to allow expeditious removal for repair, replacement, or decontamination.

All instrument piping contains test connections with appropriate valves to expedite test and calibration.

Operational Criterion (4)

Vent paths shall be provided to assure adequate drainage in preparation for scram reset.

Response

As discussed in Operational Criterion 3, the hydraulic coupling between the drives and the SDIV is sufficient to assure adequate drainage to the SDIV without benefit of the vent system. Further, venting capability is provided by redundant series high point vent valves following scram reset.

Operational Criterion (5)

Vent and drain functions shall not be adversely affected by other system interfaces. The objective of this requirement is to preclude water backup in the scram instrument volume which could cause spurious scram.

Response

Each SDIV has an independent drain line, connected directly to a closed radwaste system drain tank. The drain lines are continuously sloped to the drain tank. The interface at the drain tank is above normal water level, assuring undisturbed flow into the tank. The drain tank is vented to atmosphere. The drain tank is located at a lower elevation than the SDIV's.

Design Criterion 1

The scram discharge headers shall be sized in accordance with GE OER-54 and shall be hydraulically coupled to the instrumented volume(s) in a manner to permit operability of the scram level instrumentation prior to loss of system function. Each system shall be analyzed based on a plant-specific maximum inleakage to ensure that the system function is not lost prior to initiation of automatic scram. Maximum inleakage is the maximum flow rate through the scram discharge line without control rod motion summed over all control rods. The analysis should show no need for vents or drains.

Response

The design of the scram discharge headers incorporates the recommendation proposed by GE OER-54 of March 14, 1972. The scram discharge headers are hydraulically coupled to their respective SDIV's with downward sloping piping. The scram discharge headers (4" and 6") are connected to large diameter (12-inch) piping that is coupled to the 24-inch diameter vertical pipe which forms the instrument volumes, providing 297.15 gallon and 345.2 gallon capacity (not including volume below Technical Specification scram setting) for east and west side scram discharge fluids. Required minimum volumes per scram are 200.4 gallons and 203.74 gallons, respectively (see Table 1). As described in response to functional criterion 1, the system provides sufficient capacity to receive the exhaust from a full scram after the automatic scram function is initiated.

In the event of vent valve failure, the system would drain to the SDIV as a result of the hydraulic coupling described above. With the drain disabled, inleakage will initiate the SDIV high level alarm at an accumulation of 21.8 gallons. A rod block with associated alarm, will be initiated below 40 gallons prior to reactor scram below 57 gallons.

The scram discharge headers have been sized so that the system automatically scrams, without need for vents or drains, with a maximum simultaneous inleakage of 5 gpm per drive. An analysis has been performed to verify that sufficient volume remains to accomodate a scram when level in the SDIV reaches the scram setpoint.

Design Criterion 2

Level instrumentation shall be provided for automatic scram initation while sufficient volume exists in the scram discharge volume.

Response

As discussed in Design Criteria 1 and previous responses, the piping volumes are sufficient to contain the water released from a full scram based on Functional Criteria 1. Each discharge volume is equipped with two thermally actuated and two float type level switches for scram initiation.

Design Criterion 3

Instrumentation taps shall be provided on the vertical instrument volume and not on the connected piping.

Response

The SDIV level instrument piping is connected to the vertical large diameter piping (24" diameter) which functions as the Instrument Volume (IV) and are independent of the drain and vent lines.

This design protects the instruments from hydro-dynamic forces produced during scram or reset. The level switches will be functionally tested using water after the operational test scram to be performed at rated temperature and pressure following installation of this modification; however, testing will not be performed following subsequent scrams.

Design Criterion 4

The scram instrumentation shall be capable of detecting water accumulation in the instrumented volume (s) assuming a single active failure in the instrumentation system or the plugging of an instrument line.

Response

Each instrumented volume has two sets of instrument taps, providing two parallel hydraulic circuits. Scram level instruments in both hydraulic circuits assure that failure of a single instrument, or plugging of one instrument line will not prevent scram initiation. (See Figure 1.)

Design Criterion 5

Structural and component design shall consider loads and conditions, including those due to fluid dynamics, thermal expansion, internal pressure, seismic considerations, and adverse environments.

Response

The conditions considered in the design of structure and components include steady-state operating conditions in the design power range, and the transient conditions that occur in the course of system startup, shutdown, and testing.

The dynamic effect of hydrodynamic piping loads was evaluated and the loads were included in Equation 9, Paragraph NC3654, ASME III, along with other loads. The designated Operating Basis Earthquake (OBE) with a reactor scram is treated as an upset condition using associated allowable stresses per the ASME Code, Article NC3000. Table 2 shows the load combination used in analyses.

Design Criterion 6

The power-operated vent and drain valves shall close under loss of air and/or electric power. Valve position indication shall be provided in the control room.

Response

The air-operated vent valves and drain valves will close in the event of loss of air supply or electrical power. Valve positions will be indicated in the control room.

Design Criterion 7

Any reduction in the system piping flow path shall be analyzed to assure system reliability and operability under all modes of operation.

Response

There will be no diameter reduction in the scram discharge system piping. The system piping increases in diameter from the 3/4-inch discharge lines to the 24-inch instrument volumes, and slopes toward the drain to assure adequate draining during plant operation. Plugging of a single instrument vent or drain line is considered a single failure and will not prevent scram initiation. All other SDV piping is greater than 2 inches.

Design Criterion 8

System piping geometry (i.e., pitch, line size, orientation) shall be such that the system drains continuously during normal plant operation.

Response

Refer to Response to Design Criteria 1 & 7 and Operational Criterion 5.

Design Criterion 9

Instrumentation shall be provided to aid the operator in the detection of water accumulation in the instrumented volume (s) prior to scram initiation.

Response

Each SDIV will have a water level alarm and rod block instrumention which initiate below the scram level setpoint. Hydraulic coupling is addressed in response to Design Criteria 1 and 7.

Design Criterion 10

Vent and drain line valves shall be provided to contain the scram discharge water, with a single active failure and to minimize operational exposure.

Response

As indicated in the response to Safety Criterion 2, the drain and vent lines contain two air-operated, fail closed valves in series. A check valve is also provided in each vent line to minimize the spread of contamination upon scram reset.

Surveillance Criterion 1

Vent and drain valves shall be periodically tested.

Response

The drain and vent valves will be periodically tested per the Monticello ASME Code Section XI Inservice Inspection and Testing Program.

Surveillance Criterion 2

Verifying and level detection instrumentation shall be periodically tested in place.

Response

The alarm, rod block and scram instruments will be periodically tested as stated in the proposed Technical Specifications. After testing, the instrument chamber will be drained to the SDIV through the instrument lines to assure proper valve lineup.

Surveillance Criterion 3

The operability of the entire system as an integrated whole shall be demonstrated periodically and during each operating cycle, by demonstrating scram instrument response and valve function at pressure and temperature at approximately 50% control rod density.

Response

Once a cycle instrument response and valve function will be demonstrated by scramming the plant from approximately 50% or less control rod density.

Table 1

Volume Available in the Scram Discharge Volume

	EAST VOLUME	WEST VOLUME
Volume in existing 4" and 6" diameter headers	96.5 gal	97.06 gal
Volume in 12" diameter header leading to the SDIV	144.0 gal	207.04 gal
Volume in SDIV above worst case scram setpoint (57 gal)	56.65 gal	41.1 gal
Volume in SDIV below worst case scram setpoint	57 gal	57 gal
Total Volume	354.15 gal	402.2 gal
Total Volume above worst case scram setpoint	297.15 gal	345.2 gal

Required Scram Volume

EAST VOLUME	WEST VOLUME
200.4 gal	203.74 gal

TABLE 2

SCRAM DISCHARGE VOLUME PIPING LOAD COMBINATIONS

LOADING COMBINATION	SERVICE LIMITS	STRESS LIMITS
PO + DW	Sustained	(B31.1-1977 $1.0S_h$)
PO + DW + OBE	Occasional	$1.2S_h$
PO + DW + FV	Occasional	$1.2S_h$
PO + DW + SSE	Faulted (FSAR)	$2.4S_h$ (FSAR)

NOTE: In addition to the primary stress, thermal expansion and OBE anchor movement stresses are considered in accordance with Code B31.1-1977.

Thermal Expansion (104.8.3A) *EQN. 13	TH + SAM	S_A
Thermal Expansion (104.8.3B) *EQN. 14	PD + DW+ TH+ SAM	$S_A + S_h$

* Either EQN. 13 or EQN. 14 must be met B31.1-1977

PIPE SUPPORTS

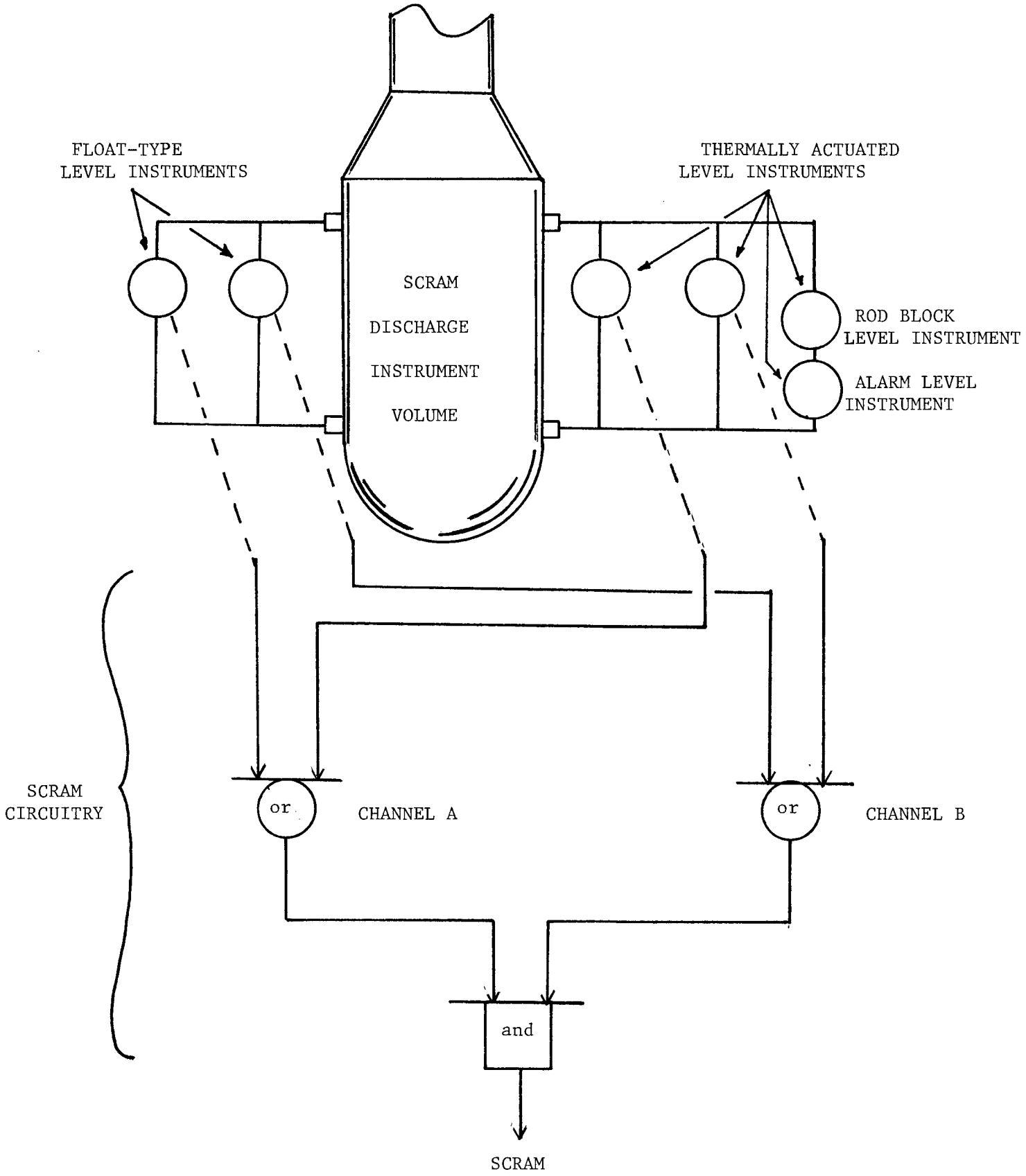
SERVICE LIMITS	LOADING COMBINATIONS	STRESS LIMITS
Sustained	TH + DW	B31.1 - 1977
Occasional	DW + FV + TH DW + OBE + TH + SAM	B31.1 - 1977
Occasional	DW + SSE + TH	B31.1 - 1977

Where:

- PD - Design Pressure
- PO - Operating pressure
- DW - Piping dead weight
- OBE - Operational Basis Earthquake
- SSE - Safe Shutdown Earthquake
- FV - Fast Valve Closure
- TH - Loads due to thermal expansion of the pipe
- SAM - Seismic Anchor Movement

FIGURE 1

SCRAM DISCHARGE VOLUME INSTRUMENTATION (TYPICAL OF EAST AND WEST INSTRUMENT VOLUMES)



ATTACHMENT B

Scram Discharge Instrumentation Volume Level Instruments

The Scram Discharge Volume modification will provide diverse instrumentation. Each Scram Discharge Instrument Volume (SDIV) has four level sensing instruments that provide inputs to the scram circuitry. In the past, all four instruments were float type i.e., passive type devices. The new SDIV's will have two float type and two thermally activated instruments.

The thermally activated instruments are not sensitive to instrument drift in the same way that other instruments in Table 4.1.2 listed as belonging to group "E" are affected. However, the thermally activated instruments do not precisely fall into the category of passive type devices either. Therefore, we propose listing a "D" and an "E" for the scram discharge instrumentation under "group" in Table 4.1.2.

The calibration method will be the same for both types of instruments. Due to the low drift associated with this type of device and the lack of sensitivity to drift, the 3 month minimum frequency of calibration is more than adequate.