DAIRYLAND POWER COOPERATIVE

La Crosse, Wisconsin

54601

February 1, 1979

In reply, please
refer to LAC-6104

DOCKET NO. 50-409

Director of Nuclear Reactor Regulation
ATTN: Mr. Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: DAIRYLAND POWER COOPERATIVE
LA CROSSE BOILING WATER REACTOR (LACBWR)
PROVISIONAL OPERATING LICENSE NO. DPR-45
CONTAINMENT PURGING DURING NORMAL PLANT OPERATION

Reference: (1) NRC Letter, Ziemann to Madgett, dated November 29, 1978.

Gentlemen:

Reference 1 asked Dairyland Power Cooperative to commit to cease all containment ventilating (purging) during normal plant operations or to provide a justification for continued containment venting at LACBWR. We have evaluated the effects of containment venting cessation on facility operations and personnel and have determined that this action would create significant problems. It is our intention, therefore, to justify continued unlimited containment ventilation in accordance with Option 3 of Reference 1.

A. Evaluation of Plant Operations Without Containment Venting

The LACBWR containment building, which is designed for continuous ventilation, not only contains the reactor vessel, but also most of the associated reactor plant equipment. This equipment is normally operated and maintained during plant operation, thus requiring routine entry by Operations and Maintenance personnel. Additionally, Technical Specification surveillance requirements necessitate frequent entry into the containment building by Operations personnel. A normal resident period for Operations personnel in the containment building is approximately 2.5 man hours per day. Cessation of containment venting would result in excessive radiation exposure to LACBWR personnel. Any future restriction on personnel access to the containment building could have a deleterious effect on plant operations and safety.

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Cessation of containment venting would also have a detrimental affect on primary system leak rate determination. The lower reactor cavity is purged and slightly pressurized with clean outside air to prevent entry of airborne activity from other containment building areas which could cause false leakage indications or mask an actual primary system leak. The lower cavity pressurization would have to be stopped to prevent excessive containment pressure buildup. Additionally, the buildup of activity without ventilation would cause the fixed filter monitors to reach levels that would render them useless for primary system leak detection. Before containment venting could be limited or stopped at LACBWR, the primary leak detection system would probably have to be redesigned and extensively modified.

B. Description of the Existing Containment Building Ventilation System

Referring to Dwg. Nos. 41-400-238 and b/LR-42 (enclosed), the containment building ventilation system utilizes two 30-ton, 12,000 cfm air-conditioning units for drawing fresh air into the building and for recirculating 19,000 cfm air throughout the building. The air enters the containment building through a 20-inch intake duct and is exhausted from the building by a centrifugal exhaust fan which has a capacity of 6,000 cfm at 4 inches of water static pressure. An exhaust fan draws air from the two forced circulation pump cavities. A normally-closed manually-operated damper is provided for an intake duct used for exhausting 1,000 cfm of air from the upper portion of the containment building (elev. 745 ft. 3 in.) in the event of high airborne activity in the upper portion of the building. A 4-inch vent header, routed from the upper and lower reactor cavities, retention tanks, seal inject reservoir, shield cooling surge tank and from the fuel storage well, vent to the exhaust fan inlet upstream of the exhaust system filters, is also exhausted by this system during normal operation. The exhaust fan discharges through the 20-inch exhaust duct to the outside stack.

The containment building ventilation system has five 20-inch flanged, viton-seated, butterfly valve-type isolation dampers. Each damper has a spring-loaded air cylinder operator and two three-way solenoid-actuated control air valves. The dampers are located inside the containment vessel in the ventilation system air intake and exhaust ducts that pass through the containment vessel. Four of the dampers will be used in the event of an accident to shut off and seal the plant ventilating air system, preventing the release of radioactive fission products to the atmosphere. Two of these four dampers are in the inlet duct and two are in the exhaust duct; the second damper in each duct provides backup protection if one of the dampers fails. The fifth damper is located in the recirculation duct downstream of the exhaust fan and is normally closed. It automatically opens when the building isolation dampers are closed, to permit air recirculation in the containment building.

The spring-loaded cylinder operators are designed for quick opening or closing of the isolation dampers when actuated. Each cylinder is operated by air from the control air system at 75 to 100 psig, through electrically latched, manually reset, 3-way solenoid valves rated for 120-v a-c service. The solenoid valves will normally be energized to air-load the butterfly-valve air cylinder operators and to keep open the butterfly valves, except for the air recirculation valve, which is closed under normal conditions. When the solenoid valves are de-energized, they act to vent the air cylinder operators and allow the spring loading quickly to close or open the butterfly valves as required. The closing time design criteria for the four isolation dampers is 10 seconds after receipt of signal. Results of Technical Specification tests have demonstrated that the isolation dampers actually close within 2 seconds or less.

In addition to remote manual operation from the Control Room, all four isolation dampers will automatically close for any one of the following signals: (a) high activity measurement by the gaseous monitor or either particulate monitor sampling the exhaust duct air leaving the containment building, (b) high reactor pressure, or (c) high containment building pressure. The isolation dampers have redundant actuating control circuits and are fail safe in that they will close on loss of air to the valve operator or less of electrical power to the solenoid valves.

Whenever the 20-inch isolation dampers are automatically closed by a high activity trip from the exhaust duct monitors, air flow from the reactor cavities and the fuel storage well is automatically diverted from the normal exhaust path through the building exhaust ventilation to that portion of the 4-inch vent header which discharges at the stack inlet plenum. The 4-inch vent header from the containment building contains a normally open control valve on each side of the containment vessel wall. The control valve inside the containment building is automatically closed upon a signal caused by a high reactor pressure or high containment building pressure. The control valve in the piping tunnel area can be manually closed from the control room. These valves are also fail safe and will close on either loss of air or electrical power.

C. <u>Modification to the Existing Containment Building Ventilation System</u>

The isolation valves (55-25-003 and 55-25-004) in the 4-inch vent header are maintained open during normal plant operation. Valve

55-25-003, located inside containment is automatically closed on high containment pressure or high reactor pressure. Valve 55-25-004, located outside containment can be remote, manually closed from the control room.

Since this 4-inch vent header is not required for normal containment venting when the 20-inch ventilation dampers are open, this 4-inch vent header is infrequently used. We have decided, therefore, to keep these two valves in the 4-inch vent header closed during normal operations. The valves will be opened from the control room switches when required by Operations personnel (e.g., whenever the 20-inch isolation dampers are closed). The control circuits will be further modified (see Figure 1) so that whenever they are in the open position, both valves will be automatically closed by either high containment pressure or high reactor pressure. This proposed modification will provide protection against a single failure which could prevent containment isolation when required, at the 4-inch ventilation header penetration.

D. Basis for Unlimited Containment Ventilation

D.1 Isolation Valve Closure

The ability of the 20-inch isolation dampers to close against the dynamic forces of a design basis loss-of-coolant accident is discussed in the LACBWR Safeguards Report, Section 6.6.4.

In summary, these isolation valves are designed to withstand, and to operate at, the maximum containment vessel pressure of 52 psig. The dampers are capable of repeated sealing against a differential pressure of 60 psi from either side. The design will accommodate a maximum indoor temperature of 280°F and a simultaneous outdoor temperature of -27°F when dampers are closed. The isolation dampers in the intake and exhaust ducts are periodically leak tested by pressurizing between the two dampers in each duct.

D.2 Impact on ECCS Performance

Referring to Dwg. Nos. 41-300-080 and 41-400-237 (enclosed), the Emergency Core Cooling System (ECCS) consists of two separate subsystems: The High Pressure Core Spray (HPCS) and the low pressure Alternate Core Spray (ACS). These systems automatically supply cooling water to the reactor vessel to minimize fuel damage due to a Loss-of-Coolant Accident (LOCA).

The HPCS systems includes two pumps which normally take suction from the 41,000 gallon overhead storage tank. The pumps are started automatically on either a low vessel water level (-12 in.) signal or a high containment pressure (+5 psig) signal. When the reactor vessel and containment building pressures are equalized, as after a major system leak or rupture, a low pressure supply line bypassing the HPCS pumps allows water to flow directly from the overhead storage tank to the HPCS header.

The low pressure ACS includes two diesel-driven service water pumps which take suction from the river. When containment building pressure exceeds 5 psig, both diesels will start automatically and supply water to the vessel through either of the two motor-operated valves which open automatically when containment building pressure reaches 5 psig coincident with a reactor vessel water level of -12 inches.

The HPCS system is the principal short-term ECCS, since it was expressly designed to provide the required core cooling for the full spectrum of pipe breaks. The HPCS system also backs up the ACS system for long-term cooling via two water supply systems which are external to the containment building: the high pressure service water system and the demineralized water system.

The ACS system is the principal long-term ECCS and can be used for short-term cooling provided reactor pressure decreases to 150 psig. It is an effective back-up to the HPCS system for relatively large LOCA's which depressurize the reactor system rapidly (e.g., main steam line break). For small breaks in which reactor pressure decays very slowly, the ACS system can only be effective after reactor pressure is reduced. The only small LOCA which requires ACS operation is the HPCS pipe break. It has been determined that depressurization of the reactor to 150 psig will take about 28 minutes for the largest HPCS pipe break and that during this time the upward flow of steam through the core is sufficient to keep the core cool. For smaller HPCS piping breaks, sufficient time is available to the operator to evaluate the problem and to initiate manual depressurization of the reactor system. This depressurization would automatically initiate operation of the ACS system to provide the required core cooling. An evaluation has been made of the existing ECCS and it has been determined that normal ventilation of the containment building has no effect on ECCS water sources, equipment operation or automatic initiation of the HPCS system. The proposed circuit modifications described in Section C further ensure that automatic initiation of the ACS system will not be affected by normal containment ventilation. It should be noted, however, that since ACS is the preferred long-term cooling system or the short-term cooling system for a LOCA in the HPCS piping, automatic initiation is not a necessity since in either situation the ACS system is not required for at least the first 28 minutes following a LOCA. Beyond this time period, Operations personnel will have assessed what actions are required to mitigate the effects of a LOCA and the ACS can be manually started if required.

Based on the above, even if the 20-inch ventilation dampers did not isolate the containment building, there would still be no detrimental effect on ECCS operation.

D.3 Radiological Consequences

An evaluation of the radiological consequences of the maximum credible accident was made by Allis-Chalmers. Containment Ventilation system operation was assumed and compliance to 10 CFR 100 was demonstrated in Amendment 3 to the Operating License (ACNP-63584, dated August, 1963).

D.4 Instrumentation and Control Circuits

The review of instrumentation override circuitry requested by Reference 1 has been completed. A review of the design of all safety actuation signal circuits associated with containment ventilation isolation system, which incorporate a manual override feature, was performed. The primary reason for the design review was to ensure that bypassing of one signal would not also bypass other safety actuation signals and potentially negate automatic system action is needed.

Thie review is based on the isolation valve circuits shown on LACBWR Dwg. No. 41-503-773 or Figures 2 and 3, (enclosed) except for the 4-inch vent header isolation valve circuits modified as shown in Figure 1 and discussed in Section C. The valves are designed to close upon receipt of the noted actuation signals.

1. Twenty-inch Ventilation System Isolation Dampers.

   (2 inlet valves in series: 73-25-001 and 73-25-002 and 73-25-006). Dampers automatically close on the following signals:

   a. High containment building pressure (Ch. 1 or Ch. 2),
   b. High reactor pressure (Ch. 1 or Ch. 2), or
   c. High radiation level from gaseous or particulate monitors in ventilation exhaust duct.

2. Four-inch Vent Header Valve Inside Containment (55-25-003)

   Valve automatically closes on the following signals:

   a. High containment building pressure (Ch. 1 or Ch. 2), or
   b. High reactor pressure (Ch. 1 or Ch. 2).

3. Four-inch Vent Header Valve Outside Containment (55-25-004)

   Valve autor' 'cally closes on the following signals:

   a. High containment building pressure (Ch. 1 or Ch. 2), or
   b. High reactor pressure (Ch. 1 or Ch. 2).

Of all the actuation signals listed above, only the high reactor pressure trip signal can be bypassed. The containment building is isolated on high reactor pressure in anticipation of possible primary system relief valve operation. The high reactor pressure signal therefore does not provide containment isolation due to a pipe break LOCA. Only one of the two reactor pressure channels can be bypassed at a time, and therefore, the redundant channel is alwasy available for its protective function. The purpose of the bypass function is for channel calibration.

We have determined that overriding (bypassing) one pressure channel does not also cause the bypass of any other safety actuation signal within the containment venting isolation system. Note that the two high reactor pressure channels are also used in the reactor scram logic system; however, the same bypass restriction applies. The bypassing of the reactor pressure safety signal is administratively controlled by procedure. Bypass switches are operable only by use of bypass keys which are under the control of the Shift Supervisor. The bypass key must be turned to the bypass position for the channel to be bypassed prior to turning the mode switch on the channel instrument drawer to test. Failure to perform this preliminary step will result in a reactor scram. The turning of the mode switch to test bypasses the containment isolation functions and scram function on that channel only. In the case of the high reactor pressure bypass switch, the bypass key must be inserted and rotated to the designated channel to be bypassed. (Two channels cannot be simultaneously bypassed).

When the bypass switch is placed in the bypass mode, a red indicator light adjacent to the switch is continuously illuminated while the bypass condition is in effect. Additionally, operation of a bypass key activates a common audio and visual annunciation "Key Switch in Bypass". The audio indication may be terminated by acknowledgement of the annunciation. The visual indication remains until all bypasses are removed.

Our review of the containment ventilation isolation instrumentaion and control circuit designs determined (a) that bypassing of one safety actuation signal does not also cause the bypass of any other safety actuation signal, (b) that sufficient physical features are provided to facilitate adequate administrative controls and (c) that the use of the manual bypass is annunciated at the system level for every system impacted. Based on this determination, there are no non-conforming circuits and therefore no design or procedural changes are required.

Should you have any questions regarding this submittal, please contact us.

Very truly yours,

DAIRYLAND POWER COOPERATIVE

Frank Linder

Frank Linder, General Manager

FL:RES:af

cc: J. Keppler, Dir., NRC-DRO III

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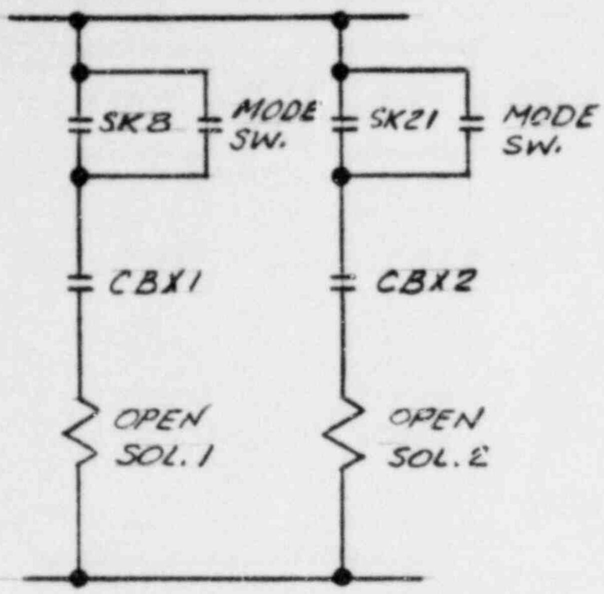

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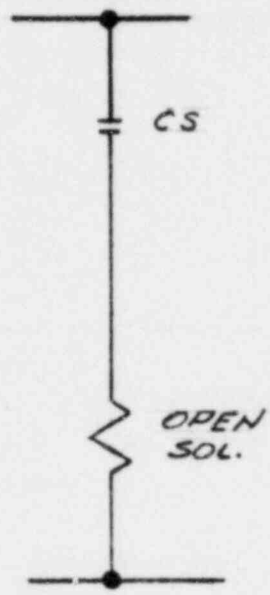
55-25-003



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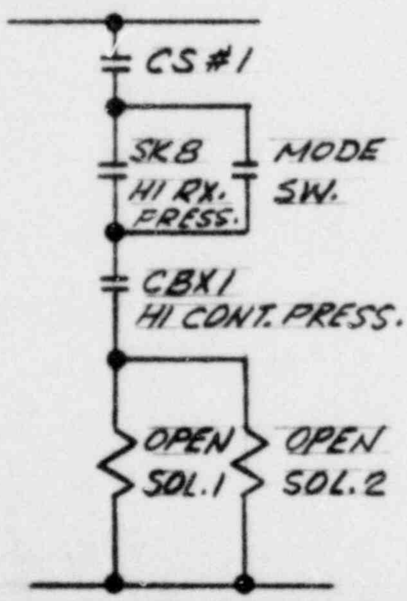

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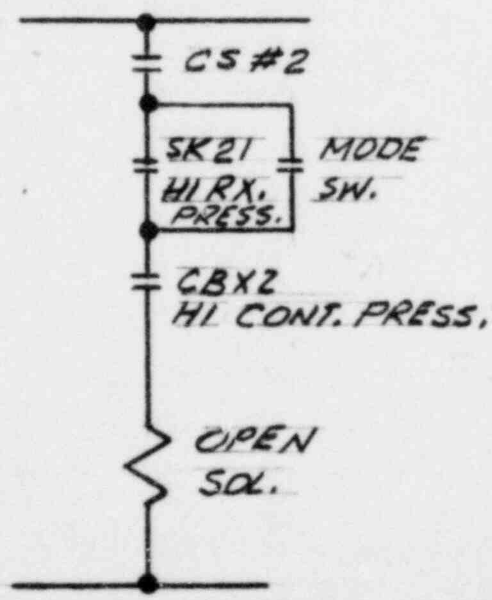

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CONTROL CIRCUIT MODIFICATION
4" VENT HEADER ISOLATION
(REF. DWG. 41-503-773)

LAC-6071

FIG. 1