DAIRYLAND POWER COOPERATIVE • P.O. BOX 817 • 2615 EAST AV SOUTH • LA CROSSE, WISCONSIN 54601
(608) 788-4000

June 3, 1985

In reply, please
refer to LAC-10934

DOCKET NO. 50-409

Director of Nuclear Reactor Regualtion
Attn: Mr. John Zwolinski
Operating Reactors Branch #5
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: DAIRYLAND POWER COOPERATIVE
LA CROSSE BOILING WATER REACTOR (LACBWR)
PROVISIONAL OPERATING LICENSE NO. DPR-45
GENERIC ITEM B-24, CONTAINMENT
PURGING/VENTING DURING NORMAL OPERATIONS

References:
(1) NRC Letter, Crutchfield to Linder, dated April 30, 1985.
(2) DPC Letter, Linder to Crutchfield, LAC-9971 dated June 5, 1984.
(3) DPC Letter, Linder to Eisenhut, LAC-7320 dated January 16, 1981.
(4) NRC Letter, Crutchfield to Linder, dated September 20, 1983.
(5) NRC Letter, Crutchfield to Linder, dated December 12, 1980.
(6) DPC Letter, Linder to Crutchfield, LAC-8335 dated June 9, 1982.
(7) DPC Letter, Linder to Crutchfield, LAC-10032 dated July 11, 1984.
(8) DPC Letter, Linder to Crutchfield, LAC-8546 dated August 31, 1982.

Dear Mr. Zwolinski:

Reference 1 recommended that further study of the plant unique reasons for venting the LACBWR containment be undertaken to determine which plant modifications or changes in operating practices would be most cost-effective in limiting vent or purge system operation. Reference 2 stated that a study of purge/vent operations for safety related reasons would be submitted by July 1, 1985. The necessity of venting the Containment Building (CB) has been re-examined both from a safety and cost standpoint.

There are 3 main reasons the CB as-is needs to be vented. They are accessibility, pressure reduction and leak detection. All are inter-related.

A001
1/0

CONTAINMENT BUILDING ACCESSIBILITY

Containment Building accessibility is important at LACBWR. Instead of the drywell/Reactor Building combination common to other U. S. BWRs, LACBWR has a Containment Building which contains the reactor, the primary system, and auxiliary systems equipment. The Fuel Element Storage Well and its attendent system are also located in the CB. Pumps, valves, filters and instrumentation in systems ranging from the High Pressure Core Spray System to the Forced Circulation System are contained in the CB. Control rod drive mechanisms including their accumulators and auxiliary systems are in the CB basement. The Shutdown Condenser, which can provide primary system pressure relief and decay heat removal during a loss of power or when the reactor is isolated from the main condenser, is located inside Containment. The Shutdown Condenser eliminates the need for the relief valves installed in other plants. The primary system code safety valves have never lifted to relieve pressure. Much of the equipment in the containment needs attention during plant operation.

Currently, the auxiliary operator tours the Containment Building twice a shift. Some of the instrument readings the operator takes include:

Reactor Gauge Glass
Control Rod Drive Gas Pressure (29)
Control Rod Drive Effluent Temperature (29)
Forced Circulation Pump Leakoff Flow
Purification Resin Bed Differential Pressure (2)
Shield Cooling Filter Differential Pressure
Seal Injection Supply to Forced Circulation Pump Filter Differential Pressure
Seal Injection Supply to Control Rod Drive Filter Differential Pressure
Control Rod Drive Effluent Flow
Overhead Storage Tank Level
Reactor Cavity Radiation Monitor Flow
Hydraulic Valve Accumulator System Pressure
Hydraulic Valve Accumulator System Level
Purification Filter Differential Pressure
Fuel Element Storage Well Filter Differential Pressure

The cost of remoting readings if it is possible to rewire the existing containment electrical penetration plates was estimated at $400,000 in 1982.

In addition to taking readings, the auxiliary operator changes filters, operates the waste water collection system, checks out abnormal control room indications, and performs many other functions. One of the most important is observation. Through the years operators have observed and isolated small leaks. They have detected incipient fires and taken corrective action prior to the occurrence of major problems. The operators have detected trends in equipment performance and provide excellent loose parts detection capability. Elimination or reduction of entries into the containment would reduce the safety which was designed into the plant with the provision of an accessible Containment Building.

Other plant personnel routinely enter the CB during operation. Health physics technicians take daily samples of reactor coolant and periodic samples from other water systems. Shift Supervisors make periodic tours. Fire and safety inspections are conducted routinely. Corrective and preventive maintenance and troublshooting are conducted. Surveillance tests are performed. Many Technical Specification required tests would not be able to be conducted if the CB was not accessible.

While some of these activities, like instrument readings, could possibly be remoted, others are more difficult or impossible. A remote primary coolant sampling system would have to be installed for use during normal operation. No system modification, though, can substitute for frequent inspection tours. Elimination of a means of detecting minor problems can result in an increase in plant transients. Such an action is contrary to the recent emphasis in minimizing plant transients.

If the CB ventilation system was totally isolated, the activity buildup (assuming steady state power operation, with coolant activity and leakage similar to normal operation) would result in personnel stay times, without supplied air breathing apparatus, being limited to approxiamtely 3.5 hours per week, after 1 day without venting; 0.9 hour per week, after 7 days without venting; and 0.7 hour per week after 9 or more days without venting. These limited stay times would not permit adequate maintenance or surveillance of the plant. Operations personnel alone average approximately 15-20 manhours per week inside the CB. Limiting venting is not consistent with the goal of maintaining personnel exposure As-Low-As-Reasonably-Achievable.

In addition to radiological problems, lack of ventilation leads to high temperatures and humidity inside the CB.

The containment building air conditioners were sized to provide adequate heat removal while ventilating the containment during operation. Experience in time periods when ventilation was interrupted indicated forced circulation pump cubicles temperatuares as high as 140°F in February. A 5 hour ventilation period dropped the temperature about 3°F. These temperatures are equal to the maximum for summertime operation with ventilation. The higher temperatures expected without ventilation would limit personnel access and lead to degradation of the reactor forced circulation pump motors and other equipment. The cost of substantially upgrading air conditioning capability by 50% is approximately $40,000 for the hardware plus installation, rewiring, etc. (1982 estimate)

Upgrading the air conditioning system would have no affect on the quality of air in an isolated containment. Even after isolation periods of a day or two due to maintenance, the air seems stale, humid and foul. Therefore, an influx of fresh air would be necessary prior to containment entries if the ventilation dampers were maintained closed.

Not only during normal operation is containment access important. At LACBWR, a remote shutdown is conducted from inside the CB. Access is thus needed at all times. In case of a fire outside containment, there would not be time to purge the Containment Building prior to entry, even if there was power available to open the CB dampers. In order to meet the applicable portions of

10 CFR 50 Appendix R, access to the CB must be available at all times.

PRIMARY SYSTEM LEAKAGE DETECTION

In addition to eliminating the possibility that a leak would be detected by visual observation, cessation of venting would adversely affect the installed primary system leakage detection systems.

The most sensitive system is the reactor cavity leak detection system. The reactor lower cavity contains most of the reactor vessel and associated piping. The primary system leak detection sensitivity is based on a measured air sweep through the cavity being routed past a monitor. This air is supplied by the plant control air system external to containment.

The reactor cavity leak detection system was installed in March 1969, following the Atomic Energy Commission review of LACBWR's primary leak detection capabilities. The system was first described in an Addendum to Amendment No. 3 to the Application for Transfer of Provisional Operating Authorization DPRA-6 for LACBWR, dated March 17, 1970. Its usage in detecting a small primary leak of less than 2 ml/hr was described in Technical Report DPC-851-21, "LACBWR Primary Piping and Reactor Vessel Leak Detection System Performance," February, 1971. This system is necessary to meet the requirements of SEP Topic V-5, "Reactor Coolant Pressure Boundary Leakage Detection."

If the containment building cannot continue venting, air can no longer be introduced into the reactor cavity, since it would pressurize the building. The sensitivity of the detection system is directly proportional to the air flow past the monitor. Therefore, decreasing the air flow would increase the size leak which could be detected. If air is not introduced into the cavity, the area will no longer be pressurized with respect to the remainder of the building. Therefore, leakage into the cavity from other sources, such as the retention tanks, would occur, which would increase the activity the monitor is detecting and mask small leaks. Discontinuation of the air sweep would also decrease the likelihood of the activity generated by a small leak and increase the time for activity released by any leak to reach the monitor to be detected.

In addition to the decrease in detection sensitivity resulting from discontinuation of the cavity air sweep, not venting the containment building would result in increased background activity, which would further limit the ability to detect small primary leaks.

The increase in background activity would also affect the forced circulation pump (FCP) cubicle monitor leak detection system, limiting its ability to detect leaks. Another method of leak detection which would be adversely affected is the humidity monitoring system. As the humidity in the building increases due to lack of ventilation, the use of dewcells to detect increased leakage would lack sensitivity. Even the indicated accumulation in the Retention Tanks is affected by CB venting. The indicated tank level is affected by building pressure. Therefore, increasing pressure or changes in pressure as venting is initiated and terminated affect the indicated tank level and hence the leakage calculation based on Retention Tank accumulation.

CONTAINMENT BUILDING PRESSURIZATION

When the Containment Building is isolated, building pressure starts increasing. Containment pressures as high as 4-4.5 psig have been observed in the past while the ventilation dampers were closed. The Containment Building high pressure actuation setpoint is set at $\leq$ 5 psig. Refer to Reference 3 for a discussion of the setpoint. Receipt of a high CB pressure signal starts High Pressure Core Spray Pumps, Alternate Core Spray Pumps, and isolates non-essential CB penetrations to name the most important effects. This would result in a design basis cold water injection transient. Therefore, operation at or near the setpoint is not acceptable.

Two of the main sources of air which serve to pressurize the Containment Building when isolated are the reactor cavity leak detection system, discussed earlier, and the air operated valves controllers. The reactor cavity leak detection system employs an approximately 15 SCFM air sweep. The 15 SCFM amounts to 22,000 ft^3/day and 150,000 ft^3/week. The containment free air volume is approximately 264,000 ft^3.

As discussed earlier, considerably more equipment is located in the LACBWR containment than at other plants. These systems contain numerous valves, many of which are air operated. Some of the air operated valves can be modulated, while others are strictly open/close valves. For example, the Shutdown Condenser inlet valves can be modulated, while the ventilation dampers are either full open or full closed.

The I/P converters associated with all the modulated valves have a constant air bleed during normal operation. The bleed rate typically ranges from 0.75-1.25 SCFM depending on the type of relay installed. A bleed rate of 1 SCFM corresponds to about 10,000 ft^3/week/valve. Also, as the valve position is changed, air is bled off from the operator, depending on whether the valve opens or closes on application of air pressure.

The air operated open/close valve controllers also bleed off air to the containment as the valve is either opened or closed. Any minor leakage in the air supply system of any valve also serves to increase the containment air mass.

The level control chambers located inside the Containment Building supply a steady bleed of air into the containment atmosphere. Two of these control chambers are used to control the Shutdown Condenser secondary side water level. Bubbler systems are used to measure level in the Overhead Storage Tank (the source of water for HPCS) and the Retention Tanks. These bubblers involve constant air flow.

As can be seen from this discussion, extensive modification would be necessary to eliminate or greatly reduce the air influx into containment during normal operation. Not only would there be a significant cost, there would be an adverse impact on safety and not only from the extensive modification work involved.

Air operated valves have the great advantage over other types of valves in

that they can be installed to fail safe on loss of air. Therefore, during a loss of power event or during a postulated hot short event, air can be shut off to the containment, (if a loss of air hasn't occurred) and valves fail to their position for achieving safe shutdown and cooldown. This fail-safe feature combined with the modulating ability of air operated valves makes them superior to other types of valves, such as motor operated valves, for most non-manual valve uses. Therefore, replacement of the air operated valves would adversely affect safety in addition to being expensive.

The plant does not have an established history of operating with the ventilation dampers and vent header valve isolated. Therefore, it is not known how fast CB pressure would increase without ventilation. Generally, in the past when the ventilation dampers were closed for any significant amount of time, the vent header has been used, though it could not adequately ventilate the building. Rough calculations show that with ventilation totally isolated, containment pressure would reach almost 3 psig after only 1 day, assuming air inflow just due to the cavity monitor leak detection system and 15 modulated valves. An increase of 1 psi per 8 hour shift has been noticed in the past when the dampers were closed.

In May 1979, the ventilation dampers opened following a reactor vessel hydrostatic test. Containment building pressure was 3 psig since a pump which vented to containment had been used to assist in pressurizing the reactor vessel. The pressure differential when the dampers opened was sufficient to collapse 10 feet of ductwork. This incident demonstrates that limited periodic venting is not a feasible option on a regular basis. Since after only 1 day without venting the pressure in the CB would be 3 psig, venting once a day would essentially cause a repeat of the 1979 incident.

VENTILATION DAMPERS

Many actions have been taken to demonstrate and improve the ventilation dampers operability over the last few years. Dynamic flow testing was performed on a prototype in 1979. Based on the tests, the NRC has stated that the dampers have been found operable and fully qualified in References 4 and 5. Additional Technical Specifications were submitted in References 6 and 7 per NRC requests. Debris screens were installed in the ventilation ducts in April 1985 to further eliminate the possibility of debris preventing closure of the dampers. The air conditioners and exhaust fan already restricted debris access to the ventilation dampers.

The Containment Building monitor setpoints were reduced to approximately 5 times background. Activity measured above the setpoint causes automatic closure of the ventilation dampers and vent header internal valve. An analysis was performed and submitted in Reference 8 on the activity which could be released following a LOCA prior to ventilation system isolation. Re-opening of containment isolation valves following automatic closure now requires manual reset of the closure signal. Especially following these improvements and analyses, there is no reason the ventilation system should not be used during normal operation.

CONCLUSION

Both DPC and the NRC agree the Containment Building ventilation dampers are fully qualified and operable. DPC has performed studies and taken actions to assure their operability if closure is necessary.

There are substantial reasons to maintain continuous ventilation. As discussed, they mainly fall in the areas of containment accessibility, leakage detection, and containment pressurization. While modifications are possible to eliminate some of the reasons for venting, a significant number remain which involve safety, significant cost, and/or extreme difficulty.

In evaluating a change which is proposed to improve plant safety, any associated adverse affects on plant safety also have to be examined. DPC's evaluation of the expected adverse affects of not ventilating shows they far exceed the benefit of not having to depend on fully operable ventilation dampers closing during an accident situation. The latter is the only benefit of not continuously venting.

The probability of experiencing a situation requiring containment isolation will be increased if the ventilation system is not used. Venting as discussed earlier improves detection of small leaks. Accessibility is important for locating the source of leakage and isolating it, if possible. Detecting, locating and stopping small leaks prevents small leaks from growing into major problems.

Containment accessibility is important to safety, reliability and good operation from the standpoints of equipment monitoring, operation, testing and maintenance. Accessibility is especially important during a fire or other event requiring remote shutdown from outside the control room.

Replacement of air operated valves with valves of another type would adversely affect plant safety. During any accident situation, air operated valves can be relied upon to either fail safe or be able to be failed safe by securing of the air supply. Elimination of this attribute is not acceptable.

DPC believes these adverse affects of stopping or limiting venting far outweigh any benefit. Partial modifications are not available which would allow venting to be limited without imposing the adverse consequences.

If there are any questions, please contact us.

Sincerely yours,

DAIRYLAND POWER COOPERATIVE

Jameson Taylor

for Frank Linder, General Manager

FL:LSG:sks

cc: J. G. Keppler Region III
NRC Resident Inspector
Richard Dudley, LACBWR Project Manager