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October 13, 1982

In reply, please
refer to LAC-8656

DOCKET NO. 50-409

Director of Nuclear Reactor Regulation
ATTN: Mr. Gus C. Lainas,
Assistant Director for Safety Assessment
Division of Licensing
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
UNRESOLVED SAFETY ISSUES STATUS FOR THE
LA CROSSE BOILING WATER REACTOR (LACBWR)

REFERENCE: (1) NRC Letter, Lainas to Linder,
dated June (sic) 6, 1982

Gentlemen:

Your letter (Reference 1) requested that we furnish information with regard to each of the identified unresolved safety issues. Each issue is addressed below.

Water Hammer (A-1)

This issue is not resolved at LACBWR, but the potential effect on safety related systems is minimal.

During reactor operation the High Pressure Core Spray is a static system, at full pressure from the pump discharge check valves to the reactor, and full of water connected to a nozzle on the reactor vessel. The pipe size is 1-1/2 inch and 2-1/2 inch and the pipe run rises to the reactor vessel connection except for approximately the last 3 feet. The line is filled (by other procedures) during pre-reactor startup.

There has been use of the HPCS on occasion in the past and no evidence of water hammer has been noted.

A001

Other piping systems may have an occasional water hammer, although, plant maintenance and operating personnel are aware of the causes and plant procedures are written to eliminate the potential, by filling and venting piping systems and pumps after draining and/or maintenance.

<u>Anticipated Transients Without Scram (A-9)</u>

This issue has been completely resolved at LACBWR. Amendment 22 to POR No. DPR-45 contains details and references.

Based on the ATWS analysis for LACBWR, we concluded that the plant can, with no modifications, withstand all ATWS events except those that result in a loss of the main condenser as a heat sink. We also concluded that if the plant were modified to include a recirculation pump trip at high reactor pressure, no damage to the reactor would occur for all ATWS events.

Subsequently, we modified the plant to include a recirculation pump trip. Additionally, Technical Specifications were issued that govern the performance of the modification.

<u>BWR Nozzle Cracking (A-10)</u>

This issue has been completely resolved at LACBWR. NRC letter, Crutchfield to Linder, dated June 16, 1981 contained your concurrence that the A-10 issue is closed with regard to LACBWR.

LACBWR does not have feedwater nozzle/sparger or control rod drive hydraulic return line designs addressed in NUREG-0619 and therefore, the specific stress corrosion conditions that lead to inside surface cracking as reported to have occurred in other BWR designs does not exist in LACBWR.

<u>Reactor Vessel Materials Toughness (A-11)</u>

A third set of irradiated reactor vessel material surveillance specimens has been withdrawn from the LACBWR vessel and analyzed. The results and details of the analysis were forwarded in DPC letter, LAC-7979, Linder to Crutchfield, dated December 15, 1981.

The projected irradiated Charpy V-notch upper shelf energies of the vessel beltline materials at vessel End-of-Life range from 50 ft-lb to 64 ft-lb. These values meet the requirements of 10 CFR 50, Appendix G.

The analysis of the specimens was done in accordance with ASTM Standard E185-79.

The trend curves were constructed in accordance with US NRC Regulatory Guide 1.99 and LACBWR data plotted on them. The measured transition tempertaure shifts follow the calculated trend curve quite well.

We, therefore, conclude that the LACBWR vessel has adequate margin for continued safe operation.

Systems Interaction in Nuclear Power Plants (A-17)

LACBWR has not conducted a comprehensive program that separately evaluates all structures, systems, and components important to safety for the three categories of adverse systems interactions, which are; (1) spatially coupled, (2) functionally coupled, and (3) humanly coupled. However, the plant design requirements were founded on the principle of defense-in-depth. Studies have been made and identified the physical separation and independence of redundant safety systems as well as protection afforded against hazards such as high energy line ruptures, missiles, high winds, flooding, seismic events and fires, and sabotage with satisfactory results. A study of control room human factors is presently underway.

With regard to the Phase I results of USI A-17 and the one interaction that required immediate corrective action, namely, the power-operated relief valve (PORV) and its block valve, LACBWR is exempt because it does not have PORV's.

Environmental Qualifications of Safety-Related Electrical Equipment (A-24)

This issue not completely resolved for LACBWR.

Further details and summary of equipment qualification program can be found in DPC letter, LAC-7790, Linder to Crutchfield, dated September 14, 1981. Justification for continued plant operation is also in this letter.

We have replaced essentially all the equipment required for safe shutdown and accident mitigation with environmentally qualified equipment in the harsh environment.

Two areas of equipment replacement remain, e.g., one of three water level transmitters in the safety system, and solenoids to the internal MSIV. Action for qualification of the High Pressure Core Spray Motors is not finalized.

Work is continuing on the action required for environmental qualifications of equipment for the mild environment.

We expect to meet the intent of the entire qualification program within the guidelines and time frame established by the NRC.

Residual Heat Removal Requirements (A-31)
Shutdown Decay Heat Removal Requirements (A-95)

This issue was addressed completely as SEP Topic VII-3, "Systems Required for Safe Shutdown", provided in DPC Letter LAC-8535, Linder to Crutchfield, dated August 26, 1982.

LACBWR usually uses the main condenser for initial cooldown, then the Decay Heat System is used to finish and maintain the cooled down condition.

All piping, valves, and pump are designed for full reactor pressure, therefore, the BTP 5-1 requirements of isolation, pressure relief, and pump protection are incorporated or not relevant because of the full system pressure capability.

Although the decay heat system is normally used during routine shutdown of the reactor, it has no redundant components and lacks redundant power supplies; however, the function of cooldown is provided for by use of the shutdown condenser, high pressure core spray system or manual depressurization and Alternate Core Spray systems thereby providing redundant diverse methods for cooldown.

The shutdown condenser will bring the reactor to almost cold shutdown from operating conditions. The condenser relies on boil off of secondary water to accomplish cooldown. Therefore, RCS temperature will approach cold shutdown. The heat removal capacity is so large (equivalent to > 10% of rated power) that steam inlet flow must be controlled to avoid excessive thermal stress to the reactor vessel.

The decay heat system has a blowdown line to the main condenser that can be used during a "Feed and Bleed" operation using the HPCS pumps to feed the system and the blowdown line to reduce and maintain the reactor water level at a predesignated level. Thus the primary system can be cooled by this mode as an alternate cooldown method.

When the manual depressurization and alternate core spray systems are used to cool down, the vent valves provide a rapid depressurization to atmospheric pressure and the alternate core spray will cool the core indefinitely. The capacity of the combined cooling of the shutdown condenser (≥ 10% of rated power) from operating temperature to 470°F and the Decay Heat Cooling System below 470°F with a heat removal capability about 1/6 that of the shutdown condenser (or alternatively high pressure core spray or manual depressurization with the vent valves), the cooldown can be accomplished.

Control of Heavy Loads Near Spent Fuel (A-36)

This issue is not completely resolved at LACBWR. The latest submittal was DPC letter, Linder to Crutchfield, LAC-8524, dated August 25, 1982. This letter supplied additional information related to General Guidelines 4, 5 and 9 of NUREG-0612. The other information on the other guidelines had been previously submitted.

We believe that we are in compliance with the provisions of NUREG-0612.

Technical Specifications exist which fully control the handling of heavy loads over fuel in the FESW. The LACBWR program for handling heavy loads satisfies the guidelines of Section 5.1 of NUREG-0612.

Seismic Design Criteria (A-40)

This issue has been resolved for LACBWR. Details and specific information are contained in "Letter to All SEP Owners" from Crutchfield, dated June 17, 1981. Attachment 1 to this letter contained site specific ground response spectra development for LACBWR by Lawrence Livermore Laboratory.

Geologic review of the LACBWR site has been completed. Site liquefaction identified the potential of separating underground piping that supplied the Alternate Core Spray (ACS) System. This potential pipe separation was resolved by DPC installing an Emergency Service Water Supply System that takes water directly from the Mississippi River and directing it to the ACS piping in the Turbine Building. The Turbine Building and Containment Building and certain internal piping are intact during and after the site specific seismic event.

Pipe Cracks at Boiling Water Reactors (A-42)

This issue is resolved at LACBWR except for the issuance of Technical Specifications. NRC Letter, Crutchfield to Linder, dated March 4, 1981, contained a request for Technical Specifications submittal and a Safety Evaluation by the Office of NRR of the LACBWR piping.

This Safety Evaluation concluded the accelerated augmented ISI for nonconforming non-sensitive lines has been completed on the LACBWR. Augmented ISI of non-conforming service sensitive lines is necessary. The last of the augmented inspections on non-conforming service sensitive lines was completed in May 1981, with no indications found. LACBWR is on an ISI program to inspect the non-conforming service sensitive lines in an 80 month, instead of a 120 month, interval. Technical Specifications to comply with these requirements of NUREG-0313, Rev. 1, were submitted December 8, 1981.

Containment Emergency Sump Reliability (A-43)

This issue is not applicable to LACBWR. The issue revolves around emergency core cooling pumps being capable of recirculating water from the containment suppression pool or containment collection point to the core following a LOCA.

LACBWR is not designed to recirculate any water from anywhere in the Containment Building. In fact, the plant is designed to flood containment up to core midplane as a last step in long term core cooling after a LOCA.

Station Blackout (A-44)

This issue is considered resolved. The La Crosse Boiling Water Reactor was not designed to accommodate a complete loss of all alternating current power, that is, a loss of both the offsite and the emergency diesel generator A-C power supplies. LACBWR has not experienced a station blackout in over 13 years of commerical operation.

However, in reviewing the plant capability to cope with effects of a fire, a highly reliable alternate method of safely shutting down the reactor, maintaining hot shutdown, and/or cooling down to cold shutdown at a controlled rate using no electrical pumps, no electrical controls and no electrical indication was developed. Instrumentation is powered from battery sources and would be used, if available, however, electrical instrumentation is not necessary for the LACBWR to attain a cold shutdown in a controlled manner. Therefore, this procedure, in place in the Operating Manual, is to be used during a station blackout. Further details are in DPC letter, LAC-8624, Linder to Crutchfield, dated September 28, 1982, Attachment 1, Part 4.

Seismic Qualifications of Equipment in Operating Plants (A-46)

This issue is actively being pursued at the LACBWR under the SEP.

Areas that have been analyzed and found satisfactory are the main structures, including containment, turbine, redundant diesel-generator building and stacks. The electrical portions of safe shutdown systems have been either analyzed, inspected, tested, and/or modified to meet the specified criteria. The High Pressure Core Spray piping system has been modified to meet the specified seismic criteria.

Other systems are currently under review for qualification and required modifications identified in the Integrated Assessment in the SEP will be implemented as determined.

Safety Implications of Control Systems (A-47)

LACBWR being an older plant, was designed with only two automatic control systems that are subject to this issue. One, the feedwater pump control system, varies feed pump speed to maintain reactor vessel water level during plant operation. This system is independent, electrically, from any safety system, although the level sensor shares a standpipe on the reactor vessel with the safety system level sensors. The other is an automatic pressure controller that varies turbine-generator loading to maintain reactor vessel pressure. This system uses components that are separate, electrically and mechanically, from any safety system.

LACBWR does not utilize automatic recirculation pump control, nor automatic rod controls, nor does the plant utilize any power operated relief valves. (IE Information Notice 79-22).

A review of the buses supplying power to the safety and non-safety related instrumentation and control systems has been conducted and we have determined that a loss of an individual bus would not effect the ability of the plant to achieve a cold shutdown condition. The plant has emergency and operating procedures relating to a loss of electrical power to electrical buses and also to achieving a cold shutdown under those conditions. (IE Bulletin No. 79-27).

Hydrogen Control Measures and Effects of Hydrogen Burns on Safety Equipment (A-48)

This is not a significant issue at LACBWR because the potential for generation of hydrogen following a LOCA is not large. LACBWR fuel element cladding is stainless steel, not a zirconium alloy. There is no containment sump from which the water is recirculated through the core, there are no chemicals in the containment building spray water (and the containment spray is an optional system, manually initiated).

LACBWR has installed redundant hydrogen analyzers that receive their input from the containment atmosphere. Any hydrogen generated in the primary system would normally be vented to the reactor containment building through the pipe break causing the LOCA or through the Manual Depressurization System Valves. The LACBWR design does not contain a suppression pool so the primary safety valves (3) and the Manual Depressurization System Valves (2) relieve directly into the reactor containment building. The suction for the analyzers is near the top of the containment building. As any noncondensible (including hydrogen) would be vented directly into the open area of the reactor containment through either the safety valves or the Manual Depressurization Valves, any hydrogen present would collect at the high point of containment and thus be drawn through the hydrogen analyzers. However, they will not be connected to the reactor containment unless an accident occurs, they can be functioning within 30 minutes of the event.

If you request any further information, please contact us.

Very truly yours,

DAIRYLAND POWER COOPERATIVE

James W. Taylor
for Frank Linder, General Manager

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cc: J. G. Keppler, Regional Administrator, Region III
NRC Resident Inspector