

# NRC Research and/or Technical Assistance Report

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RESTART OF CORE SPRAY AND LPCI SYSTEMS ON LOW LEVEL,  
NUREG-0737, ITEM II.K.3.21, LA CROSSE BOILING  
WATER REACTOR

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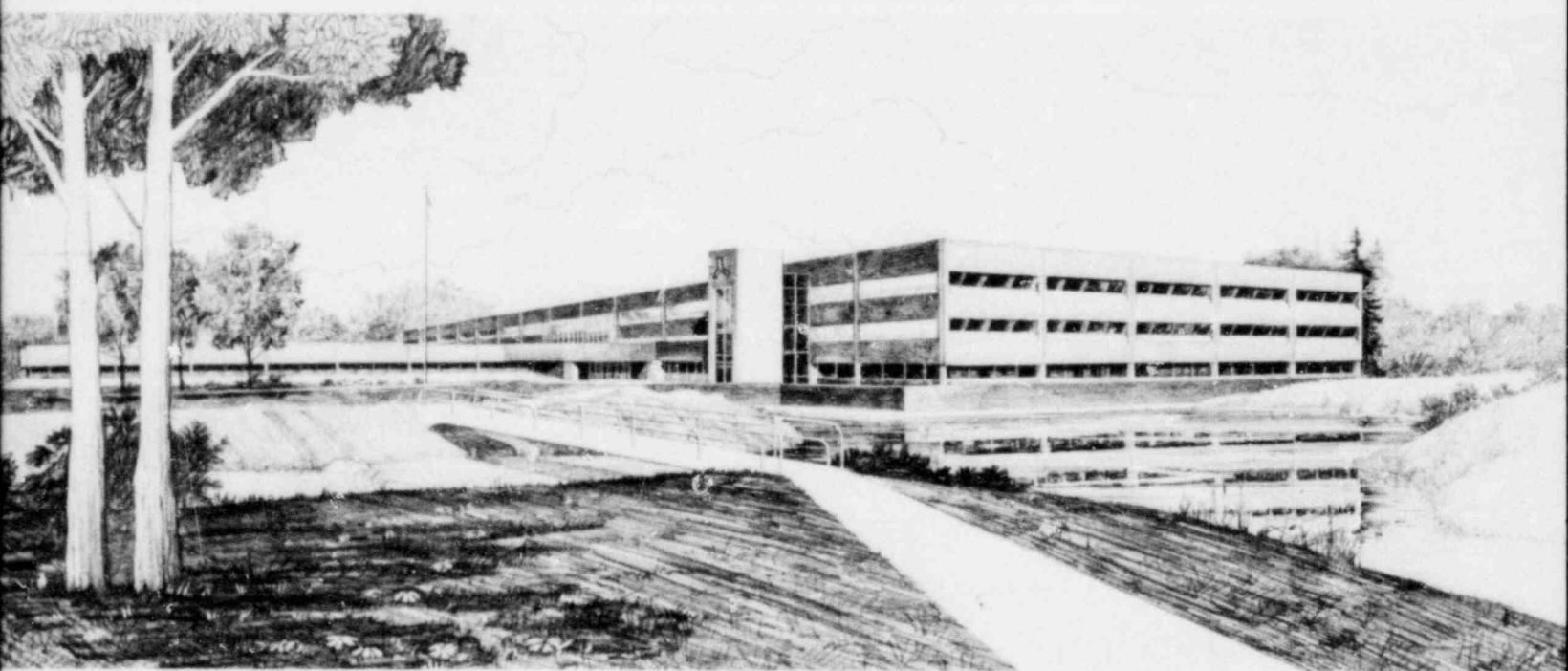
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PRELIMINARY



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## INTERIM REPORT

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## INTERIM REPORT

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RESTART OF CORE SPRAY AND LPCI SYSTEMS ON LOW LEVEL  
NUREG-0737, ITEM II.K.3.21  
LA CROSSE BOILING WATER REACTOR

Docket No. 50-409

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EG&G Idaho, Inc.

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## ABSTRACT

This review evaluates Dairyland Power Cooperative's assessment of the restart of core spray and low pressure core injection on low reactor water level at La Crosse Boiling Water Reactor. (NUREG-0737, Item II.K.3.21)

## FOREWORD

This report is submitted as a part of the "Operating Reactors--TMI Lessons Learned, NUREG-0737 Response Evaluation" being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by EG&G Idaho, Inc.'s Reliability and Statistics Branch.

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## TECHNICAL EVALUATION REPORT

### RESTART OF CORE SPRAY AND LPCI SYSTEMS ON LOW LEVEL

#### NUREG-0737, ITEM II.K.3.21

#### LA CROSSE BOILING WATER REACTOR

### 1.0 INTRODUCTION

On May 7, 1980, the NRC requested the Dairyland Power Cooperative (DPCo) to assess the capability of the La Crosse Boiling Water Reactor core spray and low pressure coolant injection systems to restart automatically on loss of reactor water level after coolant flow had been stopped by the reactor operator. DPCo was also requested to propose design modifications to meet the requirements of the letter including a discussion of the design with respect to Sections 4.12, 4.13, and 4.14 of IEEE Standard 279-1971, supporting information, drawings and changes to technical specifications.

DPCo responded to the NRC's request by a letter dated September 3, 1980.<sup>2</sup> This report evaluates the La Crosse compliance with the NRC requirements.

### 2.0 DESIGN BASE CRITERIA

The design base criteria that were applied for this task are contained in the May 7, 1980, letter from NRC to DPCo. The NRC position states "The core spray and low pressure coolant injection (LPCI) system flow may be stopped by the operator. These systems will not restart automatically on loss of water level if an initiation signal is still present. The core spray and LPCI logic should be modified so that these systems will restart, if required, to assure adequate core cooling."

Modification of system design should be in accordance with IEEE Standard 279-1971,<sup>3</sup> Section 4.12, 4.13, and 4.16.

### 3.0 DISCUSSION AND EVALUATION

La Crosse Boiling Water Reactor emergency core cooling consists of the high pressure core spray system and the alternate core spray system. The following is a brief description of the existing core spray systems and a discussion of how they compare with the design base criteria.

3.1 High Pressure Core Spray. The high pressure core spray (HPCS) system consists of two core spray pumps, piping, and valves. The manual and remote operated valves in the HPCS flow path are normally open whenever the reactor is pressurized and boron injection has not been started.

Initiation of the HPCS is from redundant high containment pressure switches or redundant low reactor water level switches. Either function will automatically start both HPCS pumps.<sup>4</sup> The HPCS pumps may be stopped by manually switching the pump control switches to the off position. If a pump is switched to the off position, the switch is spring loaded to return to the automatic position when the handle is released. A reactor low water level signal will immediately restart the pump. Only by placing the switch handle in the pullout position can the operation of the HPCS pumps be inhibited.<sup>2</sup>

Evaluation: Drawings were not available for detailed evaluation. Reference letters indicate the HPCS meets the intent of NUREG-0737, Section IIK.3.21<sup>5</sup> and IEEE Standard 279-1971.

3.2 Alternate Core Spray System (ACS). The ACS is the principle long term emergency core cooling system. The ACS consists of two diesel driven pumps, automatic valves, and automatic start logic. High containment pressure will start both pumps. Low reactor water level opens the automatic valves permitting ACS flow to the spray nozzle when reactor pressure is below 150 psig. When water level in the reactor rises above the trip level set point, the automatic valves close. The valves will continue to cycle to maintain a constant water level in the reactor. The engine driven pumps remain in operation as long as containment pressure remains high.

The automatic valves have manual key operated off-on control switches with the keys maintained under administration control. The engine driven pumps also have manual off switches to permit surveillance and testing.

Evaluation: Drawings were not available for detailed evaluation. Referenced letters indicate that the ACS meets the intent of NUREG-0737, Section II.K.2.31. Manual stopping of the diesel pumps is indicated in the control room by red annunciators. Manual closing of the automatic valves is indicated by red and green indicating lights above each switch.

#### 4.0 CONCLUSIONS

The high pressure core spray and alternate core spray systems of La Crosse Boiling Water Reactor do meet the requirements of NUREG-0737, Section II.K.3.21 for automatic system restart. They also meet the requirements of IEEE Standard 279-1971 for indication in the control room when stopping the core spray pumps or closing the alternate core spray valves.

La Crosse Technical Specifications Sections 4.2.2.15 and 4.2.2.18 provide adequate control of the manual bypass of the Core Spray Pump and alternate core spray automatic valves.<sup>6</sup>

#### 5.0 REFERENCES

1. NRC letter, Eisenhut to all operating reactors, dated May 7, 1980.
2. DPCo letter, Linden to D. G. Eisenhut, Subject--"DPCo La Crosse Boiling Water Reactor Provisional Operations License No. CPR-45, Additional TMI Requirements", LAC-7112, dated September 3, 1980.
3. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations".
4. DPCo letter, Linden to H. Denton, subject--"Additional Information--Three Mile Island Short Term Lessons Learned", LAC-6769, dated January 31, 1980.
5. NUREG-0737, "Clarification of TMI Action Plan Requirements", Nuclear Regulatory Commission, Office of Nuclear Reactor Regulations.



6. Appendix A to Provisional Operating Authorization No. DPRA-6 Technical Specifications for the La Crosse Boiling Water Reactor (LAC BWR).  
Date: March 3, 1978.