August 21, 1985

Docket No. 50-298

Mr. J. M. Pilant, Technical
Staff Manager
Nuclear Power Group
Nebraska Public Power District
Post Office Box 499
Columbus, Nebraska 68601

Dear Mr. Pilant:

SUBJECT: NUREG-0737, ITEM II.F.2, INADEQUATE CORE COOLING INSTRUMENTATION

Re: Cooper Nuclear Station

On October 26, 1984, the NRC staff sent Generic Letter (GL) No. 84-23 (Reactor Vessel Water Level Instrumentation in BWRs) to Nebraska Public Power District and other BWR licensees. This generic letter outlined the importance of reactor vessel water level instrumentation in BWRs. The staff concluded that permanent physical improvements should be made on a deliberate schedule to reduce the burden on the operator. Two improvement categories were proposed that, if implemented, would result in increased assurance that the level instrumentation will provide the instrumentation for inadequate core cooling as required by NUREG-0737, Item II.F.2. Licensees were asked to submit a description of plans to implement these improvements and a proposed schedule.

By letter dated December 13, 1984, you responded to GL 84-23 and indicated that modifications would be made to reactor vessel water level instrumentation to reduce indication errors. Subsequently, by letter dated May 31, 1985, you provided details of the two options you are considering for this modification. You stated that you will either (1) reroute the cold reference legs, or (2) install a system to inject core spray make-up water into the reference legs. One of these options will be implemented during the second refueling outage after the ongoing outage (approximately Spring 1987). We have reviewed the proposed modifications and conclude that either option is acceptable; our Safety Evaluation is enclosed. We also find the proposed implementation date to be acceptable.

Your letter of December 13, 1984 also addressed the second improvement category: replacement of mechanical level indication equipment with analog level transmitters. You stated that the analog level transmitters will be installed during the second refueling outage after the ongoing outage (approximately Spring 1987). We find that this commitment and the proposed implementation schedule adequately address the second improvement category and are, therefore, acceptable.

Consequently, this completes our review of NUREG-0737, Item II.F.2 for Cooper Nuclear Station.

Sincerely,

Original signed by/

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

DISTRIBUTION
Docket File
NRC PDR
Local PDR
ORB#2 Reading
HThompson
OELD
SNorris
ESylvester
ELJordan
JPartlow
BGrimes
ACRS (10)
Gray File
JShea, ORB#5

DL:ORB#2	DL:ORB#2	DL:ORB#2
SNorris:ajs	ESylvester	DVassallo
08/ /85	08/21/85	08/21/85

cc:

Mr. G. D. Watson, General Counsel
Nebraska Public Power District
Post Office Box 499
Columbus, Nebraska 68601

Mr. Arthur C. Gehr, Attorney
Snell & Wilmer
3100 Valley Center
Phoenix, Arizona 85073

Cooper Nuclear Station
ATTN: Mr. Paul Thomason, Division
Manager of Nuclear Operations
Post Office Box 98
Brownville, Nebraska 68321

Director
Nebraska Dept. of Environmental Control
Post Office Box 94877
State House Station
Lincoln, Nebraska 68509

Mr. William Siebert, Commissioner
Nemaha County Board of Commissioners
Nemaha County Courthouse
Auburn, Nebraska 68305

Mr. Dennis DuBois
U. S. Nuclear Regulatory Commission
Resident Inspector
Post Office Box 218
Brownville, Nebraska 68321

Robert D. Martin
Regional Administrator
Region IV Office
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

H. Ellis Simmons, Director
Division of Radiological Health
Department of Health
301 Centennial Mall, South
Post Office Box 95007
Lincoln, Nebraska 68509

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

NUREG-0737, ITEM II.F.2, INADEQUATE CORE COOLING INSTRUMENTATION

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

Generic Letter (GL) 84-23, "Reactor Vessel Water Level Instrumentation in BWRs," identified two categories of potential improvements in BWR water level instrumentation which would give increased assurance that the water level instrumentation will provide the instrumentation for inadequate core cooling as required by NUREG-0737, Item II.F.2. These improvements are: (1) improvements that will reduce level indication errors caused by high drywell temperature; and (2) replacement of the mechanical level indication equipment with analog level transmitters unless operating experience confirms high reliability.

By letter dated May 31, 1985, Nebraska Public Power District (NPPD) updated its December 13, 1984 response to GL 84-23. The May 31 letter indicated that NPPD intends to perform one of two modifications to the cold reference leg to comply with Generic Letter 84-23. These modifications are (1) rerouting of the cold reference legs, or (2) installation of a system to inject core spray make-up water into the reference legs. Our evaluation of the proposed modifications is provided below.

2.0 EVALUATION

Two conceptual designs are being considered by NPPD for compliance with GL 84-23. The first proposal is to reroute the cold reference legs so as to minimize the vertical drop of the reference legs in the drywell. This approach minimizes the error that can result from flashing in the instrument lines and is acceptable.

The second proposal is to eliminate flashing and boil-off of water from the reference legs by injecting water from the core spray system into the reference legs. In this concept, injection of a flow rate of 0.2 gpm to 0.5 gpm into the cold reference legs that have been insulated is sufficient to assure that loss of water from the reference legs is prevented.

The error resulting from injecting water into a reference leg is small because the only significant restriction in the reference legs is a ¼-inch restricting orifice inside the drywell (assuming the injection connection is made at the penetration upstream of the excess flow check valve). The restricting orifice would result in a maximum error of 2 inches of water with an injection rate of 0.5 gpm.

The core spray system is capable of providing flow into the reference legs at reactor pressure in excess of 300 psia. Therefore, flashing in the cold reference legs could be prevented with drywell temperatures as high as 417 degrees F.

Use of the core spray system to provide injection into the reference legs relies on operator action to manually initiate the cooling function. Operator action to initiate the cooling function is considered adequately reliable because:

A. Reliance on operator action is consistent with standard BWR control logic design practice. Standard practice provides automatic initiation of safety functions that are required in the short term (i.e., 10 to 30 minutes) and operator manual control for long-term safety actions (i.e., initiation of containment spray).

B. The action to initiate the cooling function is relatively simple.

C. The operator can be required to initiate the cooling function whenever significantly high drywell temperature exists (i.e., greater than 212 degrees F).

D. The operator would be provided with training that stresses the need to initiate the cooling function to prevent flashing.

E. The two events which are significant contributors to core damage frequency due to failure of the operator to detect flashing (i.e., manual shutdown with loss of drywell coolers and small-break loss-of-coolant accident (LOCA)) are relatively slow events that provide considerable time for the operator to initiate the cooling function.

This second approach to prevent flashing in the instrument lines has been used successfully in experimental systems but has had limited, if any, application in process systems. However, we see no reason why it cannot be applied successfully. Therefore, we find this second proposal to also be acceptable.

3.0 CONCLUSIONS

Based on our review we conclude that implementation of either proposal will satisfy the requirement of Generic Letter 84-23, and is, therefore, acceptable.

Principal Contributor: M. W. Hodges

Dated: August 21, 1985