UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PRESSURIZED WATER REACTORS

CONTAINMENT SUMP WATER TEMPERATURE INSTRUMENTATION

REGULATORY GUIDE 1.97

1.0 INTRODUCTION

Section 6.2 of Generic Letter (GL) 82-33 requested licensees to provide a report on their implementation of Regulatory Guide (RG) 1.97, Revision 2, and methods for complying with the Commission's regulations including supporting technical justification of any proposed alternatives or deviations. RG 1.97 recommends instrumentation to assist the control room operators in preventing and mitigating the consequences of reactor accidents.

Qualification criteria for RG 1.97 instrumentation are established based on the safety function of the system whose variables are being monitored, whether monitoring of system parameters is needed during and following an accident, and whether subsequent operator actions in the operating procedures are dependent on the information provided by this instrumentation.

A review of the licensees' submittals was performed by the staff and a safety evaluation (SE) was issued for each plant. These SEs concluded that the licensees either conformed to or adequately justified deviations from the guidance of RG 1.97 for each post-accident monitoring variable except for the variables identified in the SE.

A large number of pressurized water reactor (PWR) licensees requested deviations from the Category 2 criteria for containment sump water temperature monitoring instrumentation, but a number of the requests did not provide sufficient justification for granting the deviations. Deviation requests were denied to licensees whose SEs were issued by the staff before 1987. Since 1987, deviations for containment sump water temperature instrumentation were considered by the staff as an open item until a generic resolution was achieved. This resolution is described below.

2.0 EVALUATION

RG 1.97 recommends Category 2 containment sump water temperature instrumentation to monitor the operation of containment cooling systems. A number of licensees either do not have containment sump water temperature instrumentation or their system is only qualified to Category 3 requirements.

Licensees have provided the following justifications for not provided Category 2 containment sump water temperature monitoring instrumentation:

> Containment sump water temperature is not used in the Emergency Operating Procedures for the management of a design basis accident.
>
> The available net positive suction head (NPSH) for the residual heat removal (RHR) pumps is conservatively calculated with a sufficient safety margin such that an indication of containment sump water temperature is not required to ensure adequate NPSH.
>
> No automatic or manual actions are initiated based on containment sump water temperature.
>
> For the purpose of monitoring containment cooling, containment pressure is the variable of primary importance. Alternate indication of containment cooling status is provided by RHR heat exchanger outlet temperature, RHR heat exchanger flow, containment atmosphere temperature, containment spray flow, containment pressure, and various other instruments.

The staff has reviewed the justification provided by the licensees and has concluded that containment cooling status can be determined without the use of direct containment sump water temperature instrumentation. Since the containment sump is directly connected to the RHR system, in the recirculation mode, monitoring of RHR temperature provides an adequate alternative indication of containment cooling status. Therefore, the staff has determined that either Category 2 RHR heat exchanger inlet or outlet temperature is an acceptable alternative for Category 2 containment sump water temperature.

In some plants, the containment cooling functions is provided by the recirculation spray system and not the RHR system. In these plants, either Category 2 recirculation spray system heat exchanger inlet or outlet temperature is an acceptable alternative for Category 2 containment sump water temperature.

3.0 CONCLUSION

Based on this review, the staff has concluded that PWR post-accident containment cooling status can be determined without monitoring containment sump water temperature. Therefore, in lieu of Category 2 containment sump water temperature instrumentation, either Category 2 RHR heat exchanger inlet or outlet temperature is an acceptable alternative. In plants where the containment cooling function is provided by the recirculation spray system, either Category 2 recirculation spray system heat exchanger inlet or outlet temperature is an acceptable alternative.

Principal Contributor: B. Marcus

Date: February 15, 1994