

May 13, 1992

MEMORANDUM TO: Steven A. Varga, Director
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulations

FROM: Ashok C. Thadani, Director
Division of Systems Technology
Office of Nuclear Reactor Regulations

SUBJECT: MILLSTONE 1 ECCS ANALYSIS WITH OR WITHOUT
FEEDWATER COOLANT INJECTION FAILURE

The Reactor Systems Branch reviewed the Emergency Core Cooling System (ECCS) analysis for Millstone Unit No. 1 (MNPS-1) because of questions raised about an apparent inconsistency between a licensee Technical Specification amendment request and the staff safety evaluation granting the amendment request. This apparent inconsistency is concerned with whether or not the core would uncover during a LOCA event. Our review confirmed our understanding that the core will uncover for the limiting small break with an assumed feedwater coolant injection (FWCI) failure. Further, we also recognized that with FWCI operation there will still exist break sizes for which core uncover could occur. Core uncover was shown to occur in the updated Final Safety Analysis Report as well as the latest reload analysis dated December 20, 1990, that reconfirmed that MNPS-1 meets the criteria of 10 CFR 50.46. In fact, the core is predicted to uncover over most of the break spectrum with the worst single failure assumed. This worst single failure is the gas turbine which fails the FWCI and a train of low pressure core injection (LPCI) and low pressure core spray (LPCS). The core is predicted to recover with the available Automatic Depressurization System and the other trains of LPCI and LPCS. Thus, the apparent inconsistency is not a safety concern because the staff recognized that core uncover would occur and was considered during our review.

The licensee for MNPS-1 proposed a change to Technical Specification 3.5.C, in Amendment No. 45, dated June 18, 1990, to reduce the flow for the FWCI from 8000 gpm (original licensing basis) to 4000 gpm for loss of offsite power events only. The reduction of the feedwater flow was accomplished by a setpoint change for switching the Feedwater Control System from Level Control (normal configuration) to Flow Control with one Feedwater pump running at a minimum flow of 4000 gpm. No hardware modifications, deletions, or additions were required. This was done to prevent the gas turbine from tripping due to an overload

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condition caused by feedwater pump runout. The licensee proposed this change and the staff approved it because the limiting condition of no FWCI operation (FWCI failure) was already analyzed in the design basis for the ECCS accidents (LOCA) over the entire break spectrum. For a postulated LOCA with FWCI failure, the reactor water level will decrease causing the Automatic Depressurization System (ADS) to initiate to reduce pressure so the low pressure ECCS can recover and reflood the core and continue to meet the criteria of 10 CFR 50.46.

A statement made by the licensee in Basis C of the Technical Specifications (TS) 3.5.C for MNPS-1 reads, "For the pipe breaks for which the FWCI is intended to function, the core never uncovers and is continuously cooled, thus no core damage occurs." The specific meaning of this statement is confusing and centers on the interpretation of the phrase, "for which FWCI is intended to function." Our safety evaluation report did not use or rely on this statement as a basis for our acceptance of the FWCI gas turbine modification. Our latest review confirms our belief that there will be break sizes above which the loss of water through the break will be larger than the FWCI can replenish, and as a result, the system will ultimately depressurize and core uncover may occur. However, the consequences of these breaks will meet all the criteria of 10 CFR 50.46 and is bounded by the original licensing basis of the plant. The peak cladding temperature for the limiting small break is approximately 2150°F for no FWCI operation. This is similar to Dresden Unit 2 which shows a PCT of approximately 1900°F with failed high pressure coolant injection (approximately 5000 gpm) for about the same break size.

We have discussed with the licensee our evaluation of the possible confusion which results from the bases statement for the Technical Specification. The licensee agrees with our assessment and has agreed to amend the Technical Specification bases to state that core uncover may occur for a range of break sizes, even with the FWCI operating as intended.

Ashok C. Thadani, Director
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cc: T. Murley
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* See previous concurrence