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DOCKET NO. 50-336
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Director of Nuclear Reactor Regulation
Attn: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

References:

(1) R. A. Clark letter to W. G. Counsil, dated December 24, 1981

(2) R. Reid letter to W. G. Counsil, dated May 12, 1979

(3) R. A. Clark letter to W. G. Counsil, dated October 6, 1980

(4) R. A. Clark letter to W. G. Counsil, dated September 18, 1981

(5) W. G. Counsil letter to R. A. Clark, dated October 27, 1981

(6) W. G. Counsil letter to R. A. Clark, dated March 6, 1980

(7) W. G. Counsil letter to R. A. Clark, dated December 17, 1981

(8) W. G. Counsil letter to R. A. Clark, dated November 17, 1981

Gentlemen:

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2
ADDITIONAL INFORMATION ON CYCLE 5 RELOAD

In Reference (1), the NRC Staff requested Northeast Nuclear Energy Company (NNECO) to provide additional information to facilitate the evaluation of Cycle 5 operation at Millstone Unit No. 2. Several verbal communications between our respective staffs have also identified certain information required to support Cycle 5 operation. In response to these requests, NNECO hereby provides the following information:

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1. The analyses of a locked reactor coolant pump (RCP) rotor in the RSA assumes the availability of offsite power throughout the event. In accordance with Standard Review Plan 15.3.3 and GDC 17, we require that this event be analyzed assuming turbine trip and coincident loss of offsite power to the undamaged pumps. Appropriate delay times may be assumed for loss of offsite power if suitably justified. The event should also be analyzed assuming the worst single failure of a safety system active component. Maximum Technical Specification primary system activity and steam generator tube leakage should be assumed. The analyses should demonstrate that offsite doses are less than the 10 CFR 100 guidelines values.

Response

This analysis request exceeds that required for past reload analyses which supported both a power uprating and a change in fuel vendors. NNECO considers this request inappropriate for the following reasons:

First, both Cycle 3 operation which included a power uprating and Cycle 4 operation which included a change in fuel vendors, were licensed by the Staff with analyses of reactor coolant pump shaft seizure with offsite power available. Staff acceptance of these analyses is a part of the Safety Evaluation Report and is documented in References (2) and (3) for Cycles 3 and 4 respectively. The request for reanalysis of this event without offsite power available constitutes a change in the Plant licensing basis and is apparently being asked because the provision is contained in the current Standard Review Plan (SRP).

Secondly, it is NNECO's position that the current analysis of this transient accurately reflects the sequence of events which would occur. That is, with one reactor coolant pump shaft seized, the reactor and turbine would trip on low flow with the remaining three reactor coolant pumps continuing to run on offsite power. There is no causal relationship linking a reactor and turbine trip with a loss-of-offsite power at Millstone Unit No 2.

The SRP is not a compendium of licensing requirements but is prepared as guidance for NRC Staff reviewers within the office of NRR. Utilizing it to impose backfit requirements is inconsistent with its intended purpose. In our view, the imposition of new analytical requirements upon licensees should be shown to contribute effectively and significantly to the health and safety of the public such that both staff and licensee resources are expended in an optimal fashion. NNECO has not been provided information supporting the need for an analytical effort beyond that which has previously been provided. There are many provisions of the current SRP with which Millstone Unit No. 2 does not explicitly comply. There is no basis known to NNECO to treat uniquely this particular issue.

Therefore, NNECO considers the current analysis of the reactor coolant pump shaft seizure event adequate for the purposes of the Cycle 5 reload. This is consistent with previously docketed analyses supporting operation of Millstone Unit No. 2 through four fuel cycles. NNECO also notes that the provisions of General Design Criterion 17 are met at Millstone Unit No 2, and the plant can continue to be operated safely with the current design basis. We consider this position to be in concert with the policies of Chairman Palladino and the Commission in light of the establishment of the Committee to Review Generic Requirements.

2. Your response to our request for additional information on the BSR, dated October 17, 1981, indicates that the broken pump shaft incident is bounded by the consequences of a locked RCP rotor event. Our analysis, as addressed in SRP Sections 15.3.3 and 15.3.4, indicates that, although the initial rate of reduction in RCS flow is greater for the RCP locked rotor, the RCP shaft break event permits a greater reverse flow through the affected loop later in the transient. Thus, the resultant RCS flow rate is lower for the RCP shaft break event. Confirm that the reference October 17, 1981 statement is correct per this consideration.

   Response

   With a broken RCP shaft, the pump impeller could conceivably be free to spin in a reverse direction if the break occurred below the pump anti-reverse rotation device. In the case of a pump seizure event, the impeller would be locked in position creating a flow blockage. In the hypothetical case of a broken RCP shaft, the net effect on core flow is negligible resulting in only a slight decrease in the asymptotic three pump steady state core flow when reactor scram has occurred and power has decreased to decay heat levels.

   In reality, it will take a short time for the pump impeller to spin down and begin reverse rotation simply due to the inertia of the impeller and shaft, whereas the core flow blockage associated with a seized rotor is immediate. In both the broken shaft and seized shaft events, approach to DNB is experienced in the first 3 to 4 seconds following reactor trip. During this period, core flow for the broken shaft event is greater than that for the seized shaft event, therefore, the DNBR will be greater for the broken shaft event than for the seized shaft event.

3. For a loss of normal feedwater event, clarify whether credit is taken for overpressure control by operation of the power operated relief valves.

Response

NNECO has not reanalyzed the loss of normal feedwater event for Cycle 5 operation of Millstone Unit No. 2. However, in Reference (4) the Staff had previously requested that an analysis of this event be performed assuming the PORVs fail to open. NNECO provided the results of this analysis in Reference (5).

4. The staff is presently evaluating the need for all operating PWRs to provide adequate protection against uncontrolled boron dilution events. To evaluate this event at Millstone Unit No. 2, provide:

   a. An evaluation of the ability of the installed instrumentation channels to detect and alert the operator of a boron dilution event in Modes 3 through 6;

   b. A demonstration of the operator action time available, i.e., the time span between the receipt of an alarm or signal and the time when the shutdown margin is lost.

Response

During this event, reactivity is postulated to be added to the core by feeding primary grade water into the reactor coolant system through the Chemical and Volume Control System (CVCS).

Several instruments and indications are available to the operator which would alert him that a boron dilution event is in progress in Modes 3-6. These include volume control tank level alarms, letdown diverter valve position indication, boronometer and startup channel count rates.

The Volume Control Tank (VCT) provides the source of water for the charging pumps in the CVCS. This tank has level indication as well as high, low and low-low level alarms. In the event of an otherwise undetected dilution event, level changes and/or the level alarms would provide an indication of a make-up system abnormal condition.

The letdown diverter valve functions to divert the letdown flow to the radioactive waste system in the event the VCT has high level. The realignment of this valve from its normal VCT position to its radwaste position would provide indication of VCT makeup, and alert the operator of a boron dilution incident.

Operators at Millstone Unit No. 2 have available to them continuous indication of boron concentration. This information is provided in the control room by the boronometer. The boronometer continuously measures the boron concentration of the letdown stream for the reactor coolant system and a change in concentration could alert the operator of a boron dilution incident.

Source range nuclear instrumentation provides continuous indication of the reactivity condition of the reactor core in modes 3-6. For any condition an expected count rate would be observed. Any change in that displayed count rate would be indicative of a change in boron concentration.

NNECO concludes that the instrumentation and indication available to the operator described above would provide sufficient time to diagnose and mitigate a boron dilution event at Millstone Unit No. 2.

NNECO has provided the Staff with analyses of a boron dilution event at Millstone Unit No. 2 in References (6) and (7). These analyses utilized conservative assumptions described in Reference (6). These include:

- o Maximum charging flow for three pumps
- o Uniform Boron Concentration
- o Pumping unborated demineralized water
- o Minimum reactor coolant system volumes
- o Conservative boron worth
- o All rods out of core

As such, the results of the boron dilution analyses for Millstone Unit No. 2 are extremely conservative. Further, the requirements for operator action time prescribed at the time the plant was licensed are met for all modes of operation. It is NNECO's position that instrumentation currently available to the operator provides reasonable assurance that a boron dilution event will be recognized and mitigated prior to criticality. Current analyses demonstrate that the minimum time requirements prescribed in the licensing basis of Millstone Unit No. 2 will be met in all modes.

In addition to the information provided above in response to Reference (1), NNECO provides the following information in support of Cycle 5 operation of Millstone Unit No. 2.

For calculations of fuel clad collapse for Millstone Unit No. 2, the fuel vendor adhered to all NRC restrictions on the use of WCAP-8377.

The proposed Technical Specification 3.1.3.6 to redefine the fully withdrawn position of the regulating control element assemblies, submitted in Reference (8), has been reviewed with respect to the effects on shutdown margin and core peaking factors. NNECO has concluded that the effects of the proposed change to Technical Specification 3.1.3.6 on shutdown margin are negligible and the cycle 5 reload analyses docketed in References (7) and (8) remain valid.

NNECO has reviewed the effect on power distributions of positioning the regulating CEAs as in proposed Technical Specification 3.1.3.6 submitted in Reference (7). The small insertion of the CEAs with the resulting reactivity worth cause very minor changes in the core power distributions below the CEAs. This results in a barely detectable change in the axial peaking factor which is well within the bounds of the power distributions used in the reactor protection system setpoint determination.

The total radial peaking factor for Cycle 5 are provided below:

- For DNB Margin Analyses (Fr)

Unrodded Region	1.57
Bank 7 Inserted	1.69

- For Kw/ft Limit Analyses (Fxy)

Unrodded Region	1.58
Bank 7 Inserted	1.70

The radial peaking factors provided above include the calculated values for the Cycle 5 core plus an uncertainty allowance. The values used in the Cycle 5 safety analyses are conservatively larger than the values listed above.

We trust you find this information responsive to your requests.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

W. G. Counsil

W. G. Counsil
Senior Vice President

cc: V. Stello, Jr., Chairman
Committee to Review Generic Requirements