

CATEGORY B TECHNICAL ACTIVITY NO. B-59

Title: (N-1) Loop Operation in BWRs and PWRs

Lead Responsibility: Division of Operating Reactors

Lead Branch Chief: Robert L. Baer, Chief, Reactor Safety Branch, DOR

Task Manager: L. B. Marsh, DOR

1. Problem Description

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The efforts for Westinghouse and CE PWRs are just getting underway. The staff has received and is reviewing an ECCS analysis model for (N-1) loop operation of the Westinghouse PWRs. Meetings between Combustion Engineering and the staff have been held to discuss an ECCS evaluation model for (N-1) pump operation of the CE PWRs.

2. Plan for Problem Resolution

The plan for an orderly and thorough staff review of (N-1) loop authorization requests is divided into three tasks. The approach proposed in this task action plan involves a generic concept for Task I and a "lead plant" concept for Tasks II and III.

Some licensees may elect to reference analyses other than the "lead plant" calculations. These submittals must be individually evaluated by the staff and are outside the scope of this task action plan.

Task I - ECCS Evaluation Model

The staff will evaluate the (N-1) loop ECCS evaluation models submitted by General Electric, Westinghouse and Combustion Engineering. It is unknown at this time if Exxon Nuclear Corp. (ENC) intends on developing and submitting for staff review an (N-1) ECCS evaluation model. The reviews will be conducted on a generic basis and will include an appraisal of the input parameters and model predictions.

Task II - Steady State Performance

The staff will review the licensee's predictions of the core thermal-hydraulic and neutronic performance in steady-state situations. The review will be performed on a "lead plant" basis. The staff will also review the technical specification limits relevant to steady state operation with (N-1) loop operation to ensure conformance with the referenced analyses.

Task III - Transient Performance

Since the reactor's response during transients may be dependent on the number of loops in operation and initial coolant flow, the staff will review the licensee's calculations of the plant response with an initial (N-1) loop condition. As above, the review will be done on a "lead plant" basis and the staff will review the technical specification limits relevant to (N-1) loop transient response to ensure conformance with the referenced analyses.

Task IV - Final Reports

The staff will prepare a final report (NUREG document) describing the acceptance criteria and review guidelines developed in each of the above Tasks. A report will be generated for each NSSS design.

3. NRR Technical Organizations Involved

A. Reactor Safety Branch. Has overall responsibility for evaluating the lead plant application for (N-1) loop operation and is involved in the development of acceptance criteria relevant to Tasks I, II and III. The figures below represent the RSB's manpower needs for criterion development and final report preparation.

Manpower Estimates: FY 78 - 0.15
FY 79 - 0.20

B. Analysis Branch. Has responsibility for evaluating the ECCS evaluation models for (N-1) loop operation, which is a major segment of Task I, and the relevant transient analyses under Task II.

*Manpower Estimates: FY 78 - 0.25
FY 79 - 0.25

C. Plant Systems Branch. Has responsibility for developing acceptance criteria for the review of any protective instrumentation or control systems modifications necessary for (N-1) loop operation. The acceptance guidelines will be developed on a generic basis for each NSSS vendor under Task I, II and/or III.

*Manpower Estimates: FY 78 - 0.1
FY 79 - 0.1

4. Technical Assistance

A need for Technical Assistance from outside the NRC is not anticipated.

5. Interaction with Outside Organizations

Licensees of "lead plants," NSSS vendors and any of their contractors may be asked to supply information concerning (N-1) loop operations.

6. Assistance Requirements from Other NRC Offices

No assistance from NRC offices outside NRR is anticipated.

*These estimates include inputs necessary for criteria development and for the preparation of the final reports described under Task IV.

7. Schedule for Problem Resolution

Task I - ECCS Model and Results

General Electric	Note 1
Westinghouse - Type 1 plants*	June 1978
Westinghouse - Type 2 plants**	Note 2
Combustion Engineering	Note 3

Task II - Steady State Performance (lead plant)

General Electric (Pilgrim)	Complete
Westinghouse - Type 1 plants (Zion 1/2)	May 1978
Westinghouse - Type 2 plants (unknown)	Note 2
Combustion Engineering (Calvert Cliffs 1/2)	Note 2

Task III - Transient Performance (lead plant)

General Electric (Pilgrim)	Complete
Westinghouse - Type 1 plants (Zion 1/2)	May 1978
Westinghouse - Type 2 plants (unknown)	Note 2
Combustion Engineering (Calvert Cliffs)	Note 2

Task IV - Summary Report

General Electric	Note 1
Westinghouse - Type 1 plants	July 1978
Westinghouse - Type 2 plants	Note 2
Combustion Engineering	Note 2

Note 1

The General Electric (N-1) Recirculation Loop ECCS Evaluation Model is still under development by the vendor. Conversations with GE indicate that further information will be provided no sooner than the first quarter of 1978.

Note 2

No submittals for this plant type have been made by the NSSS vendor.

Note 3

The Combustion Engineering ECCS Partial Flow Evaluation model is still under development. No expected submittal date has been indicated to the staff.

*plants with main coolant loop isolation valves.
**plants without main coolant loop isolation valves.

8. Potential Problems

The staff's review of the ECCS evaluation model for Westinghouse and Combustion Engineering may become the critical path for those 2 vendors. Although not complete, the efforts for the GE model are well underway and only minor adjustments are anticipated. However, the Westinghouse model is still under review and the staff's evaluation of the CE model hasn't begun.

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