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POWER OPERATION OF THE HATCH 1 AND 2 REACTORS
WITHOUT FORCED RECIRCULATION

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CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
2. SAFETY AND OPERATION	1
3. DISCUSSION	1
3.1 Safety Evaluation	1
3.2 Operational Items	2
4. CONCLUSIONS	2
DISTRIBUTION	

1. INTRODUCTION

Current technical specifications for Hatch 1 and 2 preclude power operation with natural circulation. It is desirable to be able to operate for a short time in this mode so that in the event of a trip of both recirculation pumps, one or both of the pumps may be put back in service within a reasonable time to reestablish forced circulation operation without having to scram the plant.

2. SAFETY AND OPERATION

The items considered for operation at natural circulation are as follows:

- a. impact on accident analyses results;
- b. impact on transient analyses results;
- c. potential thermal stratification at low power and flow; and
- d. operational stability.

3. DISCUSSION

3.1 SAFETY EVALUATION

The loss-of-coolant accident (LOCA) analyses performed and documented in the Hatch 1 and 2 final safety analysis reports and updated for fuel reloads are limiting analyses that apply to the entire power flow map including the natural recirculation line. Thus current Hatch LOCA analyses are consistent with power operation with natural circulation.

For transient analyses the limiting transient events for power operation using only natural circulation are less limiting than the limiting transient events at full power and flow. Current reload analyses are conservatively applicable for power operation with natural circulation.

3.2 OPERATIONAL ITEMS

Operating at power with natural circulation is an operating region of reduced neutron flux damping characteristics and increases the probability of experiencing an increase in the normal neutron flux noise that occurs during boiling water reactor (BWR) operation. The consequence of such a potential noise amplitude increase is not considered to be of any safety concern. Operating recommendations to avoid or control postulated noise amplitude increases are given in Service Information Letter No. 380 Category 1.

A worst case analysis for a BWR has been performed by General Electric to bound the potential impact of neutron flux oscillations on fuel performance. These evaluations postulated limit cycle oscillations of neutron flux just below the average power range monitor scram setpoint for a 30-min duration before any operator action to mitigate the oscillations. It was concluded that no additional plastic strain is imposed on the fuel cladding and cladding incremental fatigue life usage is negligible. These conclusions have been provided to the Nuclear Regulatory Commission for information in a proprietary document.

At very low power and very low core flow for a sustained period of time some potential exists for thermal stratification to occur in the lower plenum that could cause undesirable thermal stresses on the reactor pressure vessel. BWR startup test data for a late BWR plant indicate that at power levels above approximately 5 percent good mixing occurs in the lower plenum which would preclude thermal stratification. Similar mixing is expected in any BWR jet pump plant.

4. CONCLUSIONS

Based on current technical data and analyses, there are no safety concerns associated with power operation of Hatch 1 and 2 without forced recirculation. However, there is a likelihood of experiencing some neutron flux noise which can be easily suppressed.

Power operation for prolonged periods of time at power levels below 5 percent (without forced recirculation) is not recommended in order to avoid thermal stratification in the lower plenum.

NEDO-30059

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