

February 19, 1982

Docket No. 50-244  
LS05-82-02-077



Mr. John E. Maier, Vice President  
Electric and Steam Production  
Rochester Gas & Electric Corporation  
89 East Avenue  
Rochester, New York 14649

Dear Mr. Maier:

SUBJECT: SYSTEMATIC EVALUATION PROGRAM TOPIC III-4.B, TURBINE  
MISSILES - R.E. GINNA

Enclosed is a copy of our final evaluation of Systematic Evaluation Program Topic III-4.B. This evaluation incorporates comments provided to us by your letter dated February 8, 1982.

This evaluation will be a basic input to the integrated safety assessment for your facility unless you identify changes needed to reflect the as-built conditions at your facility. This topic assessment may be revised in the future if your facility design is changed or if NRC criteria relating to this topic are modified before the integrated assessment is completed.

Sincerely,

Dennis M. Crutchfield, Chief  
Operating Reactors Branch No. 5  
Division of Licensing

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Add:  
A. Wang

Enclosure:  
As stated

cc w/enclosure:  
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Mr. John E. Maier

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# SYSTEMATIC EVALUATION PROGRAM

## TOPIC III-4.B

### GINNA

#### TOPIC: III-4.B, TURBINE MISSILES

##### I. INTRODUCTION

The purpose of this topic is to assure that, with respect to potential turbine missiles, all structures, systems and components important to safety either have adequate protection by means of structural barriers or have an acceptably low probability of damage.

##### II. REVIEW CRITERIA

10 CFR 50, Appendix A, GDC 4

##### III. RELATED SAFETY TOPICS AND INTERFACES

III-4.C, Internally Generated Missiles

##### IV. REVIEW GUIDELINES

Standard Review Plan (SRP) Section 3.5.1.3, Regulatory Guides (R.G.) 1.115 and 1.117.

##### V. EVALUATION

During November 1979, the NRC staff became aware of low pressure turbine disc cracking in Westinghouse turbines at several operating plants. Additional inspections at other plants possessing Westinghouse turbines also indicated cracking thus implying a generic problem applicable to plants with Westinghouse turbines. Consequently, on February 25, 1980, the NRC issued 50.54(f) letters to utilities with Westinghouse low pressure turbines requesting information related to this problem. Both Westinghouse and the NRC staff have been following this problem closely and have developed independent crack growth models.

The findings of multi-plant action, B-46, "Turbine Missiles," concluded that an inspection schedule based on an approach developed by Westinghouse for their turbine provides an acceptably high degree of assurance that discs will be inspected before cracks can grow to one-half of a size that could cause disc failure at speeds up to design speed.

The Rochester Gas & Electric Company (RG&E) was provided with a safety evaluation report of this approach and was requested to commit to use the four criteria listed on page 3 of the safety evaluation report (Reference 1). RG&E responded to this request (Reference 2) and committed to the four criteria. As a result of this commitment an acceptably high degree of assurance is provided that disc failures at design speed will not occur.

As a result of the turbine cracking problem, Westinghouse has revised its probability analysis of damage to safety related structures, systems and components of damage to an acceptable probability. The analysis includes utilizing the following individual probabilities: (1) the probability of turbine failure leading to the ejection of turbine missiles due to design speed failures and destructive overspeed failures (P1), (2) the probability of strike (P2) and (3) the probability of damage (P3). Since the evaluation of the latest Westinghouse probability analyses has not been completed by the staff, criteria, considering turbine cracking and the implemented inservice inspection program, have not been established for determining P1. The staff, upon completion of the Westinghouse review, will determine what actions, if any, are required.

The staff determined that the licensee performs a testing program for the overspeed protection system. Specifically, there are three different tests performed on a routine basis as follows:

At every turbine overhaul and at each refueling outage the following two tests are performed:

1. Overspeed protective test - actually overspeed turbine to trip set point to close stop and governing valves. This test is only performed during power descent and not repeated during power escalation unless problems were encountered.
2. As turbine is brought up to speed, stop and governing valves are "tested" as a normal part of the startup.

Every month except for the last two months of each cycle, while the plant is operating, power is reduced and each stop and its two associated governor valves are sequentially exercised.

## VI. CONCLUSION

The inspection program committed to by RG&E (Reference 1 and 2) provides an acceptably high degree of assurance that turbine discs will not fail at speeds up to design speed. The testing program of the overspeed protection system, including the stops and control valves at Ginna provides reasonable assurance that the overspeed protection system will remain operable and, thereby, limit the likelihood that overspeed past the design conditions would occur.

The staff concludes, for an interim period until a decision is reached regarding the need for updated probabilistic analysis of the turbine missile hazard, the probability of damage from turbine missiles is acceptably low. Should further reviews of operating plants and/or additional requirements be deemed necessary, the Ginna plant will be included with that operating plant action.

VII. REFERENCES

1. Letter from D. M. Crutchfield (NRC) to J. Maier (RG&E), August 28, 1981.
2. Letter from J. Maier (RG&E) to D. M. Crutchfield (NRC), September 16, 1981.

