NINE MILE POINT UNIT 1

SAFETY EVALUATION REPORT

EVALUATION OF TURBINE MISSLE PROTECTION

July 1984

I. INTRODUCTION

General Design Criterion 4 of Appendix A to 10CFR Part 50 requires, in part, that all nuclear generating facilities be designed in such a way to protect essential safety components, structures and systems from large, high energy fragments (i.e. missiles) which could result from a failure of the large steam turbines in the main turbine-generator set.

The purpose of this Safety Evaluation Report (SER) is to (1) demonstrate that the probability of such a missile at Nine Mile Point Unit 1 (NMP1) is low and (2) even in the unlikely event of a missile, show that all structures, systems and components important to safety at NMP1 are either adequately protected by means of structural barriers or there is an acceptably low strike probability.

II. FOCUS OF REVIEW

The focus of this review is (1) an assessment of the probability of low pressure turbine disk failure and hence the likelihood of turbine missile generation and (2) a review of the effects of a postulated worst-case missile resulting from a destructive overspeed failure of a low pressure turbine disk.

III. REVIEW GUIDELINES

The following regulatory documents provide guidance for this review:

- Standard Review Plan 3.5.1.3 "Turbine Missiles"
- Standard Review Plan 10.2.3 "Turbine Disk Integrity"
- Standard Review Plan 3.5.2 "Structures, Systems, Components to be Protected from Externally Generated Missiles"
- Regulatory Guide 1.115 "Protection Against Low Trajectory Turbine Missiles"
- Regulatory 1.56 "Maintenance of Feedwater Purity in Boiling Water Reactor"

IV. EVALUATION

An assessment which demonstates that NMP1 conforms to the turbine missile protection requirements expressed in General Design Criterion 4 is contained in MPR Associates Report No. 752, "Nine Mile Point Unit 1 Nuclear Generating Station Turbine Missile Analysis" dated December 1982. The results of this assessment may be summarized as follows:

IV. EVALUATION (Continued)

Likelihood of Rotor or Disk Failure at Nine Mile Point Unit 1

The probability of turbine missile generation at or below design speed due to a material failure is low. This conclusion is based on an overall evaluation of material properties for the three low pressure sections of the General Electric turbine-generator in operation at NMP1. Specifically, the following areas were evaluated as part of this study:

- The metallurgical characteristics of the rotor and disks were evaluated in accordance with USNRC SRP Topic 10.2.3, "Turbine Disk Integrity." All acceptance criteria for minimum rotor and disk toughness and strength are satisfied.

- The results of the Spring 1982 major turbine inspection performed by the Installation and Service Engineering Division of General Electric were reviewed and found to be favorable. In particular, General Electric has recommended that the next major inspection of the low pressure sections of the turbine be conducted in the Spring of 1988. This six year reinspection interval, based on a review of detected flaw sizes, projected growth rates, and the operating history of the turbine, is the most favorable category into which a General Electric turbine-generator set is classified.

- The overall in-service inspection and maintenance program for the turbine was evaluated using criteria set forth in USNRC SRP Topics 10.2, "Turbine Generator" and 10.2.3, "Turbine Disk Integrity." In all cases, the in-service inspection program at NMP1 is in compliance with the USNRC criteria, and provides assurance that disk or rotor flaws which could potentially lead to a failure at design speed will be detected prior to reaching critical size.

- The performance of NMP1 in minimizing the carry-over to the turbine of potentially corrosion-promoting contaminants via the steam was examined. Specifically, the equipment available for maintaining feedwater purity, together with the ability to detect and handle transients, is in compliance with the majority of the criteria set forth in USNRC Regulatory Guide 1.56, "Maintenance of Feedwater Purity in Boiling Water Reactors." As such, the potential for long term or transient carry-over of corrosion promoting elements is judged to be low.

The possibility of a turbine missile being generated as the result of a destructive turbine overspeed is remote. This conclusion is based on an examination of the various overspeed protection systems which are included in the turbine controls at NMP1. This analysis included the following:

IV. EVALUATION (Continued)

- An analysis to determine the effects of the postulated worst-case missile, a 120°, 5944 lb. segment of one of the last stage LP turbine disks. The properties of this missile were determined using data available in reports of actual turbine missiles, General Electric Report TR-5751211, "Analysis of Turbine Missiles Resulting from Last Stage Wheel Failure," and other turbine missile analyses and publications. Two possible trajectories for this postulated missile were considered in accordance with NRC SRP Topic 3.5.1.3, "Turbine Missiles,": low trajectory missiles (LTM) and high trajectory missiles (HTM). A LTM is a missile which exits the turbine with a trajectory near horizontal; an HTM is one which has a near vertical trajectory. Trajectories between these two are of no concern because the energy of potentially destructive turbine missiles is sufficiently high such that these missiles would clear the entire site.

For a postulated LTM, adequate turbine missile protection was considered to exist if one or more of the following conditions is met:

- The structure in question is not in the LTM trajectory zone as defined in USNRC Regulatory Guide 1.115, "Protection Against Low Trajectory Turbine Missiles."

- Adequate protective barriers exist. The capability of a barrier to protect a structure, system or component is determined in accordance with USNRC SRP Topic 3.5.3, "Barrier Design Procedures." Specifically, at least 36 inches of reinforced concrete is required for protection.

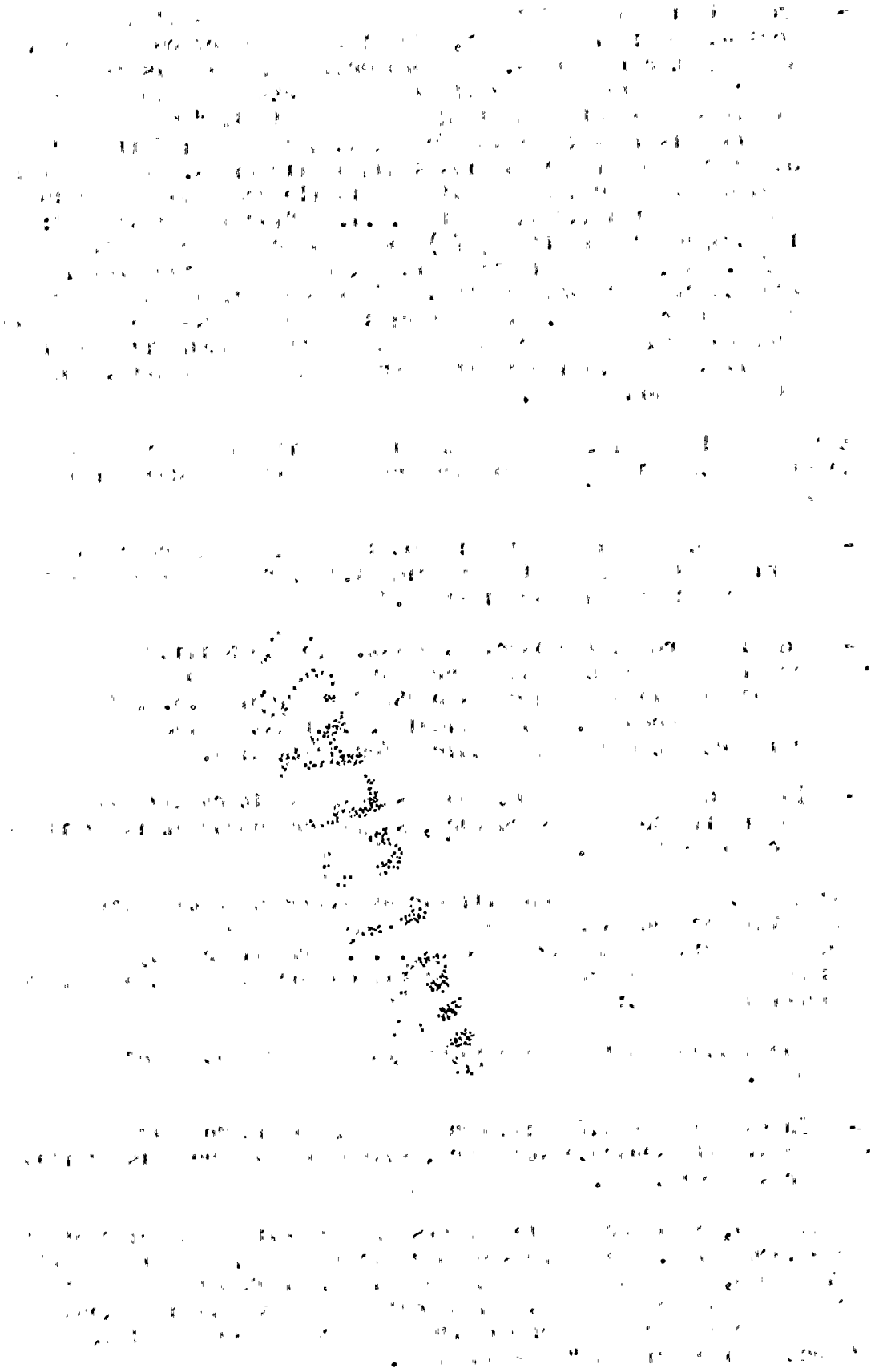
- In the case of safe shutdown systems, an alternative and physically separate structure, system or component is available for safe shutdown.

For a postulated HTM, probabilistic assessments of the strike potential for each safe shutdown system were determined in accordance with USNRC SRP Topic 3.5.1.3. On this basis, a system was considered protected from a HTM if one or more of the following conditions was met:

- The system has less than 10,000 ft^2 of horizontal target area.

- In the case of safe shutdown systems, an alternative and physically separate structure, system or component is available or safe shutdown.

In summary, no unacceptable effects of a postulated turbine missile were identified. The safe shutdown capability of the plant will be maintained, the integrity of the primary coolant boundary will be preserved and no accidents which could result in offsite exposure greater than a fraction of the limits expressed in 10CFR100, "Reactor Site Criteria" are foreseen.



NMP-9223

NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

300 ERIE BOULEVARD, WEST
SYRACUSE, N. Y. 13202

August 9, 1984

IE file Room EW 359

Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attn: Document and Control Desk

Re: Docket No. 50-220
DPR-63

Dear Sir:

Submitted herewith is the Report of Operating Statistics and Shutdown for July 1984 for the Nine Mile Point Nuclear Station Unit #1.

Also included is a narrative report of Operating Experience for July 1984.

Very truly yours,

Thomas E. Lempges

Thomas E. Lempges
Vice President
Nuclear Generation

TEL/lo
attachments
cc: Director, Office of I&E (10 copies)

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NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION UNIT #1

NARRATIVE OF OPERATING EXPERIENCE

The station operated during the month of July 1984 with a Unit Availability Factor of 100.0% and a Net Design Electrical Capacity Factor of 95.8. There were No challenges to Electromatic Relief Valves. Reduction in Capacity Factor was due to warm circulating water temperatures.

CLASS I WORK - INSTRUMENTATION & CONTROL - JULY 1984

WR#	28022	APRM #15; drawer defective, replaced with spare
WR#	28033	APRM #17; push to reset defective, recalibrated
WR#	28025	Spare APRM Drawer; repaired loose wiring in drawer
WR#	28265	APRM #15; intermediate functions not working, repaired broken connector on trip bias card.

CLASS I WORK - MECHANICAL MAINTENANCE - JULY 1984

WR#	28573	#12 CRD filter, replaced filters
WR#	26450	Core Spray Piping Welds outside Drywell, buffed welds
WR#	26448	Support #s 81-H10 & 81-H11, corrected name plates

CLASS I WORK - ELECTRICAL MAINTENANCE - JULY 1984

WR#	27777	Core Spray Test Bypass Valve, corrected wiring for indicating lights circuit
MO	1927	Replaced solenoids, replaced limit switches, sealed conduits, and reterminated leads for equipment qualification. The following systems were affected Building Emergency Ventilation, Reactor Containment Atmospheric Dilution, Reactor Containment N_2 Purge and Fill System

OPERATING DATA REPORT

DOCKET NO. 50-220
DATE 8/8/84
COMPLETED BY TW Roman
TELEPHONE 349-2422

OPERATING STATUS

1. Unit Name: Nine Mile Point Unit #1
2. Reporting Period: 7/01/84 thru 7/31/84
3. Licensed Thermal Power (MWt): 1850
4. Nameplate Rating (Gross MWe): 640
5. Design Electrical Rating (Net MWe): 630
6. Maximum Dependable Capacity (Gross MWe): 620
7. Maximum Dependable Capacity (Net MWe): 610
8. If Changes Occur in Capacity Ratings (Items Number 3 Through 7) Since Last Report, Give Reasons:

Notes

9. Power Level To Which Restricted, If Any (Net MWe):
10. Reasons For Restrictions, If Any:

	This Month	Yr.-to-Date	Cumulative
11. Hours In Reporting Period	744	5856	130,392.2
12. Number Of Hours Reactor Was Critical	744	2825.5	89,126.7
13. Reactor Reserve Shutdown Hours	0	0	20.4
14. Hours Generator On-Line	744	2762.5	86,250.5
15. Unit Reserve Shutdown Hours	0	0	1204.2
16. Gross Thermal Energy Generated (MWH)	1,371,612	4,710,383.	142,804,823
17. Gross Electrical Energy Generated (MWH)	455,246	1,578,644	47,210,425
18. Net Electrical Energy Generated (MWH)	441,955	1,530,098	45,724,857
19. Unit Service Factor	100.0	47.2	66.1
20. Unit Availability Factor	100.0	47.2	66.1
21. Unit Capacity Factor (Using MDC Net)	97.4	42.8	57.5
22. Unit Capacity Factor (Using DER Net)	95.8	42.1	56.6
23. Unit Forced Outage Rate	0.0	0.0	16.9

24. Shutdowns Scheduled Over Next 6 Months (Type, Date, and Duration of Each):

25. If Shut Down At End Of Report Period, Estimated Date of Startup:
26. Units In Test Status (Prior to Commercial Operation):

	Forecast	Achieved
INITIAL CRITICALITY		
INITIAL ELECTRICITY		
COMMERCIAL OPERATION		

(9/77)

UNIT SHUTDOWNS AND POWER REDUCTIONS

DOCKET NO. 50-220
UNIT NAME 9 Mile Pt. Unit #
DATE 8/8/84
COMPLETED BY TW Roman
TELEPHONE 349-2422

REPORT MONTH July 1984

No.	Date	Type[1]	Duration (Hours)	Reason[2]	Method of Shutting Down Reactor[3]	Licensee Event Report #	System Code[4]	Component Code[5]	Cause & Corrective Action to Prevent Recurrence
									None this month

1
F: Forced
S: Scheduled

2
Reason:
A-Equipment Failure (Explain)
B-Maintenance or Test
C-Refueling
D-Regulatory Restriction
E-Operator Training & License Examination
F-Administrative
G-Operational Error (Explain)
H-Other (Explain)

3
Method:
1-Manual
2-Manual Scram.
3-Automatic Scram.
4-Other (Explain)

4
Exhibit G - Instructions for Preparation of Data Entry Sheets for Licensee Event Report (LER) File (NUREG-0161)

5
Exhibit I - Same Source

(9/77)

AVERAGE DAILY UNIT POWER LEVEL

DOCKET NO. 50-220
UNIT 9 Mile Pt. Unit #1
DATE 8/8/84
COMPLETED BY TW Roman
TELEPHONE (315)349-2422

MONTH July 1984

DAY	AVERAGE DAILY POWER LEVEL (MWe-Net)	DAY	AVERAGE DAILY POWER LEVEL (MWe-Net)
1	607	17	593
2	606	18	593
3	597	19	592
4	597	20	590
5	598	21	592
6	600	22	592
7	597	23	592
8	597	24	588
9	597	25	589
10	600	26	588
11	597	27	591
12	596	28	589
13	595	29	587
14	594	30	588
15	590	31	585
16	592		

INSTRUCTIONS

On this format, list the average daily unit power level in MWe-Net for each day in the reporting month. Compute to the nearest whole megawatt.

(9/77)

313-127 N 10-69X (BACK)

OUTAGES – UNITS AND AUXILIARIES

MONTH July, YEAR 1984

UNIT NO.	EQUIPMENT	DAY	AVAILABLE ON	TIME	HOURS UNAVAILABLE	PARTIALLY UNAVAILABLE HOURS	PARTIALLY UNAVAILABLE CAP.	REASONS / REPAIRS
								None
								# Norm shutdown 0
								# Rx Scrams 0
								# Hrs. Rx. Crit. 744