July 13, 93

Docket No. 50-412

Mr. J. D. Sieber, Senior Vice President
and Chief Nuclear Officer
Nuclear Power Division
Duquesne Light Company
Post Office Box 4
Shippingport, Pennsylvania 15077

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Dear Mr. Sieber:

SUBJECT: ISSUANCE OF AMENDMENT NO.53 TO FACILITY OPERATING LICENSE NPF-73, IN RESPONSE TO CHANGE REQUEST NO. 16, TURBINE VALVE TESTING (TAC NO. M77640)

The Commission has issued the enclosed Amendment No. 53 to Facility Operating License No. NPF-73 for the Beaver Valley Power Station, Unit 2. The amendment consists of changes to the Technical Specifications in response to your application dated October 1, 1990, as supplemented May 28 and December 30, 1992.

The amendment revises the Appendix A Technical Specifications (TSs) relating to turbine valve testing. The amendment modifies Technical Specification 4.3.4.2 by revising the frequency of reheat stop and intercept valve testing to once per 18 months, makes certain terminology consistent with other plant documents, and relaxes the inspection cycle to a maximum of 60 months under certain conditions.

A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/S/
Gordon E. Edison, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 53 to NPF-73
2. Safety Evaluation

cc w/enclosures:
See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 13, 1993

Docket No. 50-412

Mr. J. D. Sieber, Senior Vice President
and Chief Nuclear Officer
Nuclear Power Division
Duquesne Light Company
Post Office Box 4
Shippingport, Pennsylvania 15077-0004

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G E Edison

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cc w/enclosures:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DUQUESNE LIGHT COMPANY

OHIO EDISON COMPANY

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

THE TOLEDO EDISON COMPANY

DOCKET NO. 50-412

BEAVER VALLEY POWER STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 53
License No. NPF-73

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Duquesne Light Company, et al. (the licensee) dated October 1, 1990, as supplemented May 28 and December 30, 1992, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-73 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 53, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto are hereby incorporated in the license. DLCO shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance, to be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Walter R. Butler, Director
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 13, 1993

ATTACHMENT TO LICENSE AMENDMENT NO. 53

FACILITY OPERATING LICENSE NO. NPF-73

DOCKET NO. 50-412

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

Remove	Insert
3/4 3-74	3/4 3-74
----	3/4 3-75

TURBINE OVERSPEED PROTECTION

LIMITING CONDITION FOR OPERATION

3.3.4 At least one Turbine Overspeed Protection System shall be OPERABLE.

APPLICABILITY: MODES 1, 2*, and 3*.

ACTION:

a. With one throttle valve or one governor valve per high pressure turbine steam line inoperable and/or with one reheat stop valve or one reheat intercept valve per low pressure turbine steam line inoperable, restore the inoperable valve(s) to OPERABLE status within 72 hours, or close at least one valve in the affected steam line(s) or isolate the turbine from the steam supply within the next 6 hours.

b. With the above required Turbine Overspeed Protection System otherwise inoperable, within 6 hours isolate the turbine from the steam supply.

c. The provisions of Specification 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.4.1 The provisions of Specification 4.0.4 are not applicable.

4.3.4.2 The above required Turbine Overspeed Protection System shall be demonstrated OPERABLE:

a. By cycling each of the following valves through at least one complete cycle from the running position:

1) Four high pressure turbine throttle valves at least once per 31 days,

2) Four high pressure turbine governor valves at least once per 31 days,

3) Four low pressure turbine reheat stop valves at least once per 18 months,

4) Four low pressure turbine reheat intercept valves at least once per 18 months,

* Specification not applicable with all main steam isolation valves and associated bypass valves in the closed position and all other steam flow paths to the turbine isolated.

SURVEILLANCE REQUIREMENTS (Continued)

b. By direct observation of the movement of each of the following valves through one complete cycle from the running position:

1) Four high pressure turbine throttle valves at least once per 31 days,

2) Four high pressure turbine governor valves at least once per 31 days,

3) Four low pressure turbine reheat stop valves at least once per 18 months,

4) Four low pressure turbine reheat intercept valves at least once per 18 months,

c. At least once per 18 months by performing a CHANNEL CALIBRATION on the turbine overspeed protection systems, and

d. At least once per 40 months by disassembling at least one of each of the above valves and performing a visual and surface inspection of valve seats, disks, and stems and verifying no unacceptable flaws or excessive corrosion. If unacceptable flaws or excessive corrosion are found, all other valves of that type shall be inspected unless the nature of the problem can be directly attributed to a service condition specific to that valve. For reheat stop and intercept valves the inspection cycle may be increased to a maximum of 60 months, provided there is no indication of operational distress.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 53 TO FACILITY OPERATING LICENSE NO. NPF-73

DUQUESNE LIGHT COMPANY
OHIO EDISON COMPANY
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
THE TOLEDO EDISON COMPANY

BEAVER VALLEY POWER STATION, UNIT 2

DOCKET NO. 50-412

1.0 INTRODUCTION

By letter dated October 1, 1990, Duquesne Light Company (DLC or the licensee) requested an amendment to the Beaver Valley Power Station, Unit 2 Technical Specifications (TSs) involving deletion of the surveillance testing requirements for the turbine reheat stop and intercept valves associated with the overspeed protection system. In a subsequent letter dated December 30, 1992, DLC submitted a supplement which superseded the original amendment request. This later submittal included the following change requests for technical specification (TS) 3/4.3.4: change the surveillance test interval for the turbine reheat stop and intercept valves from at least once per 31 days to at least once per 18 months; permit extension of the inspection interval of the turbine reheat stop and intercept valves to 60 months, providing there is no indication of operational distress; and, following identification of unacceptable flaws or excessive corrosion during inspection of one valve, remove the requirement to inspect other valves of that type if the nature of the problem can be directly attributed to a service condition specific to the inspected valve. Other proposed changes to TS 3/4.3.4 are editorial in nature. The licensee's response to a staff request for additional information and an analysis supporting the extended test interval for the turbine reheat stop and intercept valves was provided by DLC in a letter dated May 28, 1992.

Beaver Valley, Unit 2, is equipped with a Westinghouse turbine generator. Steam from the steam generators enters the high pressure turbine through four high-pressure steam lines. Each line contains one turbine throttle valve and one governor valve. After expanding through the high pressure turbine, the steam passes through one of four moisture separator/reheaters (MSRs). A reheat stop and an intercept valve is located in each of the four steam lines leading from the outlet of an MSR to the inlet of one of two low pressure turbines. Two steam lines supply each low pressure turbine. During operation, the valves are held open against closing springs by hydraulic fluid pressure. Actuation of the emergency trip system releases hydraulic fluid pressure in the valve actuators, allowing springs to close the valves.

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Failure of the reheat stop and intercept valves to close in any one steam line between an MSR and a low pressure turbine, coincident with generator load separation, may result in an intermediate turbine overspeed condition of up to 132 percent of rated speed. An open turbine throttle valve and governor valve in one or more high-pressure steam lines, coincident with generator load separation, may result in a destructive overspeed condition at speeds much greater than 132 percent of rated speed, regardless of reheat stop and intercept valve positions. Since closure of the reheat stop and intercept valves alone will not prevent a destructive overspeed condition, the probability of reheat stop and intercept valve failure does not significantly influence the probability of destructive overspeed. Therefore, it is only necessary to consider failure of the reheat stop valves and intercept valves with regard to overspeed conditions of up to 132 percent of rated speed.

A turbine overspeed condition significantly increases the probability of turbine missile generation relative to operation at normal speed due to the increased stress in the turbine rotor at higher operating speeds. Regular testing and inspection of the steam admission valves reduces the probability of their failure and the probability of turbine overspeed.

The NRC staff, in a letter to the Westinghouse Electric Corporation dated February 2, 1987, stated that maintaining a small probability of turbine missile generation through testing and inspection is a reliable means of ensuring safety-related structures, systems, and components are adequately protected from such missiles. This approach simplifies and improves procedures for evaluation of turbine missile risks by eliminating from consideration factors such as missile trajectory and damage probability. In the letter to Westinghouse, the staff proposed generic guidelines for total turbine missile generation probabilities of less than 1×10^{-4} per year for a favorably oriented turbine and less than 1×10^{-5} per year for an unfavorably oriented turbine.

2.0 BACKGROUND

Under the existing surveillance requirement, the throttle valves, governor valves, reheat stop valves, and intercept valves are operated through one complete cycle from their operating position every 31 days to verify operability. Following implementation of the proposed change, the reheat stop valves and intercept valves would only be tested at 18-month intervals. The licensee has proposed the change in order to reduce damage to the MSRs caused by the high steam flow rates which occur as a result of testing of the reheat stop and intercept valves.

The licensee has linked MSR damage to reheat stop valve and intercept valve cycling by measuring steam flows and pressure drops as the valves were cycled. The maximum flow was determined to be 175 percent of normal flow in the steam line opposite the steam line feeding the same low pressure turbine containing the valves under test. A large increase in the pressure drop through the steam line was also noted. The licensee concluded that these increased steam

flows during valve testing were a direct precursor of observed damage to reheat steam flow directing plates within the MSRs.

Westinghouse performed a calculation of the effects of extending the test interval of the reheat stop and intercept valves to 18 months at Beaver Valley Unit 2 using fault tree models and methodology from the Westinghouse report WCAP-11525, "Probabilistic Evaluation of Reduction in Turbine Valve Test Frequency," dated June 1987. The staff accepted the methodology of WCAP-11525 for use in determining the probability of turbine missile generation in a supplemental safety evaluation issued under a cover letter dated November 2, 1989.

The analysis performed by Westinghouse assumed test intervals of 3 months, 12 months, and 18 months for the intercept and reheat stop valves. In order to provide a bounding estimate for failure of the overspeed protection control (OPC) solenoid valves and the 20/AST solenoid valves, an 18-month test interval was also assumed for these valves. The analysis is also based on a 60-month inspection interval for the intercept and reheat stop valves. Failure rates used in the analysis for the high pressure turbine steam chest valves and solenoid valves were updated from the original values used in the WCAP-11525 report to reflect the current data base for BB-296 steam chest valve failures applicable to Beaver Valley and recent solenoid valve failure experience, respectively. In their May 28, 1992, submittal, the licensee committed to develop a surveillance program to functionally verify the operability of each turbine trip solenoid valve on a refueling frequency and to perform surveillance tests and inspections to ensure that the turbine overspeed protection system is maintained and operated consistent with the assumptions of the Westinghouse evaluation.

Considering design and intermediate overspeed failure sequences only, the calculated conditional probability of turbine missile generation for an 18-month reheat stop and intercept valve surveillance test interval, given that generator load separation occurs, was determined to be 6.79×10^{-7} per year. This value was conservatively based on the Unit 1 conditional probability of turbine missile generation given a design or intermediate turbine overspeed. The average generator load separation frequency based on Unit 2 plant trip history was calculated to be 0.22 per year. The licensee assumed a more conservative average generator load separation frequency of 0.5 per year.

The licensee assumed that 90 percent of turbine missile generation events would result from other than design and intermediate overspeed failure sequences. Therefore, the acceptance criteria for the licensee's analysis for design an intermediate overspeed failure sequences is 10 percent of the acceptance criteria for all missile generation events. For Beaver Valley, Unit 2, the product of the conditional probability of turbine missile generation for design and intermediate overspeed failure sequences, assuming proposed valve test and inspection intervals, and the assumed average generator load separation frequency satisfies the appropriate acceptance criterion.

The extension of the reheat stop and intercept valve inspection interval is based on notification the licensee received from Westinghouse that the inspection interval may be increased to a maximum of 60 months provided there is no indication of operational distress. The 60-month inspection interval was also assumed in the evaluation of turbine missile generation probability described above.

In their December 30, 1992, submittal, the licensee stated that only clearly unnecessary inspections are intended to be eliminated by the removal of the requirement to inspect all valves of a given type if the identified problem can be directly attributed to a service condition specific to the inspected valve. Valve problems which are not directly attributable to a service condition specific to the inspected valve would continue to require inspections of all valves of that particular type.

3.0 EVALUATION

Section 10.2 of the Standard Review Plan (SRP), NUREG-0800, provides guidance in evaluating the testing and inservice inspection of turbine steam admission valves. The purpose of the guidance is to ensure the turbine overspeed protection system will perform in a manner which satisfies the requirements of General Design Criterion (GDC) 4 of Appendix A to 10 CFR Part 50 with regard to the protection of structures, systems, and components important to safety from the effects of turbine missiles.

The proposed extension of the reheat stop and intercept valve test interval to once per 18 months and extension of the reheat stop and intercept valve inspection interval to once per 60 months were included as assumptions in the evaluation of turbine missile generation probability. The evaluation used a methodology previously accepted by the staff. The licensee has committed to perform surveillance testing and inspections to ensure that the turbine overspeed protection system is maintained and operated consistent with the assumptions of the evaluation. The staff reviewed the assumptions used in the evaluation and the methodology used to determine an appropriate acceptance criterion, and the staff found the approach to be acceptable. Since the evaluation demonstrates that the probability of turbine missile generation remains acceptably small following the proposed changes to the reheat stop and intercept valve test and inspection intervals, these proposed changes are acceptable.

Following identification of unacceptable flaws or excessive corrosion during inspection of one valve, other valves of that type are inspected to detect generic failure mechanisms indicated during the initial inspection. Clearly, if the identified problem can be directly attributed to a service condition specific to the inspected valve, a generic failure mechanism of the inspected valve type is not indicated. A problem directly attributable to a service condition specific to the inspected valve does not increase the expected failure probability of similar valves, and, consequently, the expected probability of turbine missile generation is not increased. Therefore, the

proposed change removing the requirement to inspect other valves of a certain type following identification of a problem in a valve of that type, providing that the nature of the problem can be directly attributed to a service condition specific to the inspected valve, is acceptable.

The proposed amendment to Beaver Valley Power Station, Unit NO. 2, TS 3/4.3.4 complies with the requirements of GDC 4 of Appendix A to 10 CFR Part 50 with regard to the protection of structures, systems, and components important to safety from the effects of turbine missiles, and the change complies with the intent of the guidance of Section 10.2 of the SRP. The proposed amendment is, therefore, acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes the Surveillance Requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (58 FR 30192). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S. Jones

Date: July 13, 1993