

March 2, 1992

Docket No. 50-412
Serial No. BV-92-007

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Mr. J. D. Sieber, Vice President
Nuclear Group
Duquesne Light Company
Post Office Box 4
Shippingport, Pennsylvania 15077-0004

Dear Mr. Sieber:

SUBJECT: AMENDMENT NO. 42 : OVERTEMPERATURE DELTA TEMPERATURE EQUATION
CONSTANT REVISION - CHANGE REQUEST NO. 56 (TAC NO. M81759)

The Commission has issued the enclosed Amendment No. 42 to Facility Operating License No. NPF-73 for the Beaver Valley Power Station, Unit 2, in response to your application dated October 9, 1991.

The amendment revises Table 2.2-1 (Note 1) for Technical Specification 2.2.1, "Reactor Trip System Instrumentation Setpoints." Specifically, it would revise a constant (K_2) in the equation used to determine the overtemperature delta temperature trip setpoint.

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/

Albert W. De Agazio, Sr. Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 42 to NPF-73
2. Safety Evaluation

cc w/enclosures:
See next page

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Document Name: 81759

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Mr. J. D. Sieber
Duquesne Light Company

Beaver Valley Power Station
Units 1 & 2

cc:

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

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. 42
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 9, 1991, 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.

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. 42 , 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



John F. Stolz, Director
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 2, 1992

ATTACHMENT TO LICENSE AMENDMENT NO. 42

FACILITY OPERATING LICENSE NO. NPF-73

DOCKET NO. 50-412

Replace the following pages of 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

2-7

Insert

2-7

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS
NOTATION

NOTE 1: OVERTEMPERATURE ΔT

$$\Delta T \frac{(1 + \tau_1 S)}{(1 + \tau_2 S)} \left(\frac{1}{1 + \tau_3 S} \right) \leq \Delta T_o \{ K_1 - K_2 \frac{(1 + \tau_4 S)}{(1 + \tau_5 S)} [T(\frac{1}{1 + \tau_6 S}) - T'] + K_3 (P - P') - f_1 (\Delta I) \}$$

Where: ΔT = Measured ΔT ;
 $\frac{1 + \tau_1 S}{1 + \tau_2 S}$ = Lead-lag compensator on measured ΔT ;
 τ_1, τ_2 = Time constants utilized in lead-lag compensator for ΔT , $\tau_1 = 8$ s,
 $\tau_2 = 3$ s;
 $\frac{1}{1 + \tau_3 S}$ = Lag compensator on measured ΔT ;
 τ_3 = Time constants utilized in the lag compensator for ΔT , $\tau_3 = 0$ s;
 ΔT_o = Indicated ΔT at RATED THERMAL POWER;
 K_1 = 1.28;
 K_2 = 0.0183/ $^{\circ}F$
 $\frac{1 + \tau_4 S}{1 + \tau_5 S}$ = The function generated by the lead-lag compensator for T_{avg} dynamic compensation;
 τ_4, τ_5 = Time constants utilized in lead-lag compensator for T_{avg} , $\tau_4 = 30$ s, $\tau_5 = 4$ s;

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS
NOTATION (Continued)

T	=	Average temperature, °F;
$\frac{1}{1 + \tau_6 s}$	=	Lag compensator on measured T_{avg} ;
τ_6	=	Time constant utilized in the measured T_{avg} lag compensator, $\tau_6 = 0$ s;
T'	=	$\leq 576.2^\circ\text{F}$ (Nominal T_{avg} at RATED THERMAL POWER);
K_3	=	0.00082;
P	=	Pressurizer Pressure, psig;
P'	=	2235 psig (Nominal RCS operating pressure);
S	=	Laplace transform operator, s^{-1} ;

and $f_1(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

- (i) For $q_t - q_b$ between -33% and +9%, $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;
- (ii) For each percent that the magnitude of $q_t - q_b$ exceeds -33%, the ΔT Trip Setpoint shall be automatically reduced by 2.52% of its value at RATED THERMAL POWER; and
- (iii) For each percent that the magnitude $q_t - q_b$ exceeds +9%, the ΔT Trip Setpoint shall be automatically reduced by 1.75% of its value at RATED THERMAL POWER.

NOTE 2: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 1.6% of ΔT span.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 42 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 9, 1991, the Duquesne Light Company (DLC) submitted a proposed change to the Beaver Valley Power Station, Unit 2 Technical Specifications (TS). The change would revise Table 2.2-1 (Note 1) for TS 2.2.1, "Reactor Trip System Instrumentation Setpoints." Specifically, it would revise a constant (K_2) in the equation used to determine the overtemperature delta temperature (OTDT) trip setpoint.

2.0 BACKGROUND

Protection against departure-from-nucleate-boiling (DNB) is provided by the OTDT trip. This trip is intended to provide protection for all combinations of pressure, coolant temperature, and axial power distribution. The setpoint for this trip is determined continuously for each reactor coolant loop during operation.

The equation for determining the OTDT setpoint includes three terms. The first term is a preset bias value which is independent of process variables. The second term compensates for the effect of temperature upon the design limit and includes compensation for piping and instrument time delays. The third term accounts for the effect of pressure and power distribution upon the design limit. The second term of the equation includes K_2 , which is proposed to be changed.

In June 1991, it was discovered that the current OTDT setpoint did not provide protection against a low DNB ratio (DNBR) at high pressure over a small range of temperatures. An analysis was prepared to determine if the DNBR would remain above the design minimum with the current setpoint if credit was taken for lowering the reactor coolant system (RCS) flow uncertainty and increasing

the minimum RCS required flow rate. That analysis, which formed the basis for a justification for continued operation, concluded that core limits would not be violated provided a RCS flow of at least 276,225 gpm is available. Current flow measurements assure a minimum flow of 276,391 gpm.

The October 9, 1991, application proposes to change the value of K_2 in the second term of the OTDT setpoint equation to provide protection against low DNBR for all pressures and temperatures of concern with the current Technical Specification 3.2.5 requirements for RCS flow rate.

3.0 EVALUATION

The proposed value of K_2 (0.0183/degree F) will ensure that the OTDT trip will protect the core against a low DNBR by tripping the reactor at the desired setpoint. The OTDT setpoint constants, that protect the core limits, were calculated using the methodology of WCAP-8745. Westinghouse submitted WCAP-8745, "Design Bases for the Thermal Overpower and Thermal Overtemperature Delta T Trip Functions," to the NRC, and in a letter dated April 17, 1986, the NRC approved its use. The staff stated that the methodology of WCAP-8745 was acceptable for referencing by Westinghouse in licensing documents for plants that operate under constant axial offset control. The staff also stated that the NRC did not intend to repeat its review of the matters described in the report as long as the material presented is applicable to the specific plant involved. DLC uses "Axial Flux Difference - Constant Axial Offset Control" in determining core operating limits at Beaver Valley Unit 2 and, therefore, satisfies the conditions of the April 17, 1986, Safety Evaluation for referencing WCAP-8745. Based on the above, the NRC staff finds the methodology used in calculating a revised K_2 value acceptable.

The non-loss-of-coolant accident (LOCA) analyses of transients that trip on OTDT and model the plant specific trip setpoint are limiting when T_{avg} is greater than 576.2 F. Above a T_{avg} value of 576.2 F, increasing the K_2 value will result in a lowering of the OTDT setpoint. Therefore, the increase in K_2 will provide an earlier trip for the non-LOCA analysis. Below a T_{avg} value of 576.2 F, increasing the K_2 value will result in a higher OTDT setpoint providing margin between the DNB limits and the setpoint in this region; thus, the protection that the OTDT trip is required to provide is not compromised.

Technical Specification Limiting Condition of Operation requirement 3.2.5, which requires the RCS flow to be greater than or equal to 274,800 gpm (includes 3.5% flow uncertainty), will remain valid with the proposed K_2 value.

Based on the discussion above, the NRC staff has concluded that the change to the OTDT equation is acceptable and will provide an OTDT trip setpoint which will protect the core against a low DNBR with a RCS flow of greater than or equal to 274,800 gpm.

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. 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 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 (57 FR 2592). 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: James Andersen

Date: March 2, 1992