March 7, 1977

DISTRIBUTION:
Docket File ACRS (16)
NRCPDR OPA, Clare Miles
L PDR DRoss
ORB#4 Rdg
VStello Gray File
KRGoller/TJCarter
RIngram 4 Extra Cy File
GZwetzig
CNelson
Attorney, OELD
OI&E (5)
BScharf (15)
BJones (4)
JMcGough
BHarless TBAbernathy
DEisenhut JRBuchanan
RBaer

Docket No.: 50-289

Metropolitan Edison Company
ATTN: Mr. R. C. Arnold
Vice President - Generation
P. O. Box 542
Reading, Pennsylvania 19603

Gentlemen:

The Commission has issued the enclosed Amendment No. 25 to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit No. 1. The amendment consists of changes to the Technical Specifications in response to your request dated July 7, 1976, as supplemented by your letters dated October 19, 1976 and January 31, 1977.

This amendment incorporates into the Three Mile Island, Unit No. 1 Technical Specifications revised pressure-temperature curves for two and three pump operation and reactor internals vent valve surveillance requirements. Changes to your proposal necessary to meet our requirements have been discussed with and agreed to by your staff.

Copies of the related Safety Evaluation and Federal Register Notice are also enclosed.

Sincerely,

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:
1. Amendment No. 25
2. Safety Evaluation
3. Federal Register Notice

cc w/enclosures: See next page

AD-OR:DOR
KGoller KRG
3/4/77

OFFICE	ORB#4:DOR	ORB#4:DOR	ORB#4:DOR	C-RSB-OT:DOR	OELD	C-ORB#4:DOR
SURNAME	RIngram	CNelson:rm	GZwetzig	RBaer	GLFess	RReid
DATE	2/23/77	2/25/77	2/23/77	2/23/77	3/1/77	3/7/77

Form AEC-318 (Rev. 9-53) AECM 0240 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1974-526-166

Metropolitan Edison Company

cc w/enclosure(s):
G. F. Trowbridge, Esq.
Shaw, Pittman, Potts, & Trowbridge
1800 M Street, N. W.
Washington, D. C. 20036

GPU Service Corporation
Richard W. Heward, Project Manager
Thomas M. Crimmins, Jr., Safety
and Licensing Manager
260 Cherry Hill Road
Parsippany, New Jersey 07054

Pennsylvania Electric Company
Mr. R. W. Conrad
Vice President, Generation
1001 Broad Street
Johnstown, Pennsylvania 15907

Mr. Weldon B. Arehart, Chairman
Board of Supervisors of Londonderry
Township
2148 Foxiana Road
Middletown, Pennsylvania 17057

Miss Mary V. Southard, Chairman
Citizens for a Safe Environment
P. O. Box 405
Harrisburg, Pennsylvania 17108

Government Publications Section
State Library of Pennsylvania
Box 1601 (Education Building)
Harrisburg, Pennsylvania 17126

Dr. Edward O. Swartz
Board of Supervisors
Londonderry Township
R. F. D. #1 - Geyers Church Road
Middletown, Pennsylvania 17057

Mr. Charles P. Hoy, Chairman
Board of County Commissioners
of Dauphin County
Dauphin County Court House
P. O. Box 1295
Harrisburg, Pennsylvania 17120

Department of Environmental Resources
ATTN: Director, Office of
Radiological Health
P. O. Box 2063
Harrisburg, Pennsylvania 17105

Chief, Energy Systems
Analyses Branch (AW-459)
Office of Radiation Programs
U. S. Environmental Protection Agency
Room 645, East Tower
401 M Street, S.W.
Washington, D.C. 20460

U. S. Environmental Protection Agency
Region III Office
ATTN: EIS COORDINATOR
Curtis Building (Sixth Floor)
6th and Walnut Building
Philadelphia, Pennsylvania 19106

cc w/enclosure(s) & Metropolitan
Edison filing dated: 10/19/76 & 1/31/77
Governor's Office of State Planning
and Development
ATTN: Coordinator, Pennsylvania
State Clearinghouse
P. O. Box 1323
Harrisburg, Pennsylvania 17120

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

METROPOLITAN EDISON COMPANY

JERSEY CENTRAL POWER AND LIGHT COMPANY

PENNSYLVANIA ELECTRIC COMPANY

DOCKET NO. 50-289

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 25
License No. DPR-50

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

   A. The application for amendment by Metropolitan Edison Company, Jersey Central Power and Light Company, and Pennsylvania Electric Company (the licensees) dated July 7, 1976, as supplemented October 19, 1975 and January 31, 1977, 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. DPR-50 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 25 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 7, 1977

ATTACHMENT TO LICENSE AMENDMENT NO. 25

FACILITY OPERATING LICENSE NO. DPR-50

DOCKET NO. 50-289

Revise Appendix A as follows:

Remove Pages	Insert Pages
iii	iii
2-6	2-6
4-59	4-59
-	4-60

Remove Figures	Insert Figures
2.1-3	2.1-3

Changes on the revised pages are shown by marginal lines.

TABLE OF CONTENTS

Section		Page
4.6	EMERGENCY POWER SYSTEM PERIODIC TESTS	4-46
4.7	REACTOR CONTROL ROD SYSTEM TESTS	4-48
4.7.1	CONTROL ROD DRIVE SYSTEM FUNCTIONAL TESTS	4-48
4.7.2	CONTROL ROD PROGRAM VERIFICATION	4-50
4.8	MAIN STEAM ISOLATION VALVES	4-51
4.9	EMERGENCY FEEDWATER PUMPS PERIODIC TESTING	4-52
4.9.1	TEST	4-52
4.9.2	ACCEPTANCE CRITERIA	4-52
4.10	REACTIVITY ANOMALIES	4-53
4.11	SITE ENVIRONMENTAL RADIOACTIVITY SURVEY	4-54
4.12	CONTROL ROOM FILTERING SYSTEM	4-55
4.12.1	OPERATING TESTS	4-55
4.12.2	FILTER TESTS	4-55
4.13	RADIOACTIVE MATERIALS SOURCES SURVEILLANCE	4-56
4.14	REACTOR BUILDING PURGE EXHAUST SYSTEM	4-57
4.15	MAIN STEAM SYSTEM INSERVICE INSPECTION	4-58
4.16	REACTOR INTERNALS VENT VALVES SURVEILLANCE	4-59
5	DESIGN FEATURES	5-1
5.1	SITE	5-1
5.2	CONTAINMENT	5-2
5.2.1	REACTOR BUILDING	5-2
5.2.2	REACTOR BUILDING ISOLATION SYSTEM	5-3
5.3	REACTOR	5-4
5.3.1	REACTOR CORE	5-4
5.3.2	REACTOR COOLANT SYSTEM	5-4
5.4	NEW AND SPENT FUEL STORAGE FACILITIES	5-6
5.4.1	NEW FUEL STORAGE	5-6
5.4.2	SPENT FUEL STORAGE	5-6
5.5	AIR INTAKE TUNNEL FIRE PROTECTION SYSTEMS	5-8
6	ADMINISTRATIVE CONTROLS	6-1
6.1	RESPONSIBILITY	6-1
6.2	ORGANIZATION	6-2
6.2.1	OFFSITE	6-2
6.2.2	FACILITY STAFF	6-2
6.3	STATION STAFF QUALIFICATIONS	6-3
6.4	TRAINING	6-3
6.5	REVIEW & AUDIT	6-3
6.5.1	PLANT OPERATIONS REVIEW COMMITTEE (PORC)	6-3
6.5.2.A	MET-ED CORPORATE TECHNICAL SUPPORT STAFF	6-5
6.5.2.B	GENERAL OFFICE REVIEW BOARD (GORB)	6-7
6.6	REPORTABLE OCCURRENCE ACTION	6-10
6.7	OCCURRENCES INVOLVING A SAFETY LIMIT VIOLATION	6-10a
6.8	PROCEDURES	6-11

The power level trip set point produced by the power-to-flow ratio provides both high power level and low flow protection in the event the reactor power level increases or the reactor coolant flow rate decreases. The power level trip set point produced by the power to flow ratio provides overpower DNB protection for all modes of pump operation. For every flow rate there is a maximum permissible power level, and for every power level there is a minimum permissible low flow rate. Typical power level and low flow rate combinations for the pump situations of Table 2.3-1 are as follows:

1. Trip would occur when four reactor coolant pumps are operating if power is 108 percent and reactor flow rate is 100 percent, or flow rate is 92.6 percent and power level is 100 percent.

2. Trip would occur when three reactor coolant pumps are operating if power is 80.7 percent and reactor flow rate is 74.7 percent or flow rate is 69.2 percent and power level is 75 percent.

3. Trip would occur when one reactor coolant pump is operating in each loop (total of two pumps operating) if the power is 52.9 percent and reactor flow rate is 49.2 percent or flow rate is 45.4 percent and the power level is 49 percent.

The flux/flow ratios account for the maximum calibration and instrumentation errors and the maximum variation from the average value of the RC flow signal in such a manner that the reactor protective system receives a conservative indication of the RC flow.

No penalty in reactor coolant flow through the core was taken for an open core vent valve because of the core vent valve surveillance program during each refueling outage.

For safety analysis calculations the maximum calibration and instrumentation errors for the power level were used.

The power-imbalance boundaries are established in order to prevent reactor thermal limits from being exceeded. These thermal limits are either power peaking kW/ft limits or DNBR limits. The reactor power imbalance (power in the top half of core minus power in the bottom half of core) reduces the power level trip produced by the power-to-flow ratio so that the boundaries of Figure 2.3-2 are produced. The power-to-flow ratio reduces the power level trip and associated reactor power/reactor power-imbalance boundaries by 1.08 percent for a one percent flow reduction.

b. Pump monitors

The redundant pump monitors prevent the minimum core DNBR from decreasing below 1.3 by tripping the reactor due to the loss of reactor coolant pump(s). The pump monitors also restrict the power level for the number of pumps in operation.

c. Reactor coolant system pressure

During a startup accident from low power or a slow rod withdrawal from high power, the system high pressure trip set point is reached before the nuclear overpower trip set point. The trip setting limit shown in Figure 2.3-1 for high reactor coolant system pressure (2355 psig) has been established to maintain the system pressure below the safety limit (2750 psig) for any design transient.

4.16 Reactor Internals Vent Valves Surveillance

Applicability

Applies to Reactor Internals Vent Valves.

Objective

To verify the operability and structural integrity of the reactor internals vent valves.

Specification

4.16.1 At least once each refueling cycle, each reactor vessel internals vent valve shall be demonstrated operable by:

a. Conducting a remote visual inspection of visually accessible surfaces of the valve body and disc sealing faces and evaluating any observed surface irregularities,

b. Verifying that the valve is not stuck in an open position, and

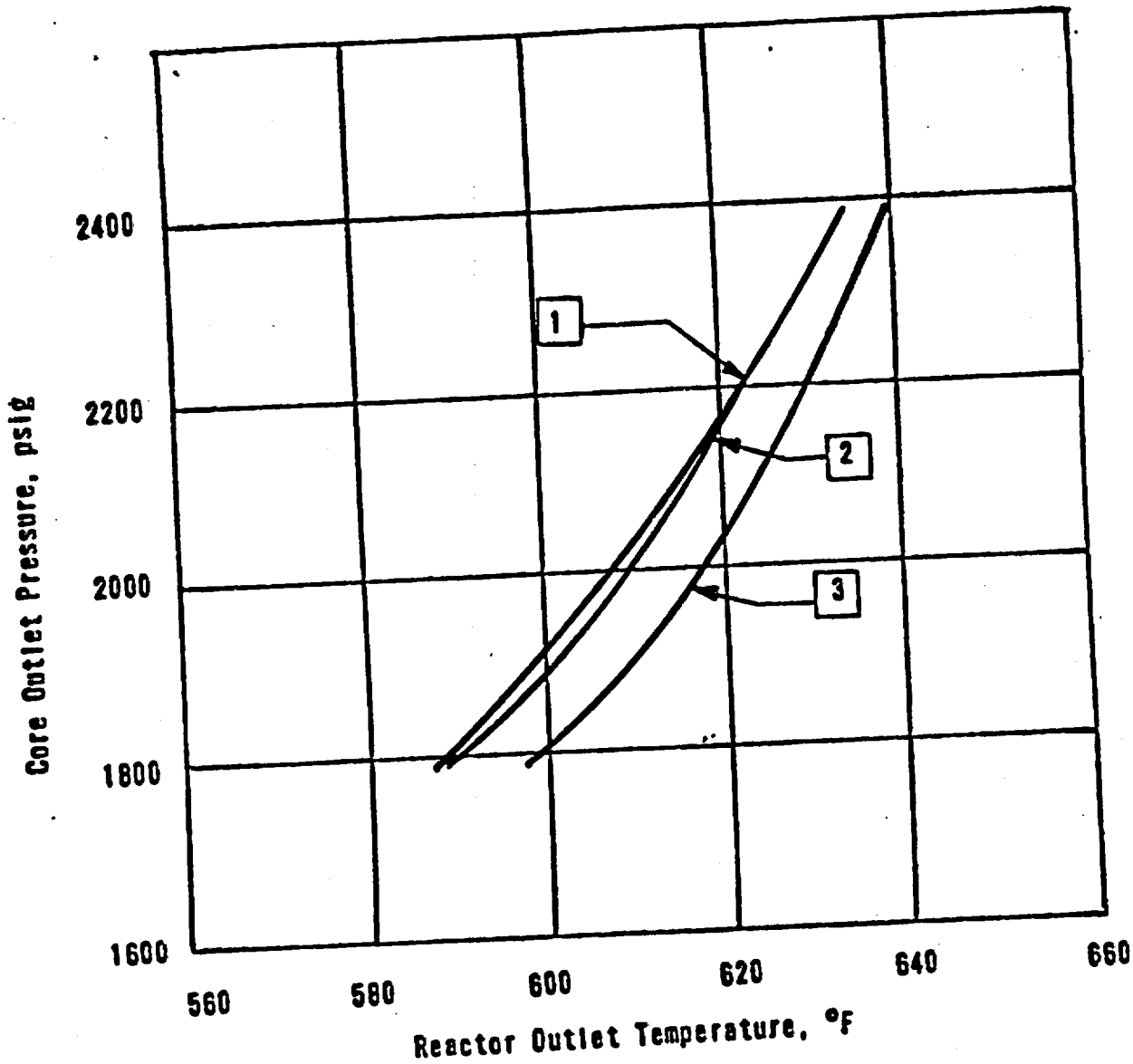
c. Verifying through manual actuation that the valve begins to open from the fully closed position with a force equivalent to $\leq$ (0.15) psid, and is fully open with a force equivalent to $\leq$ (0.30) psid.

Bases

The internals vent valves are provided to relieve the pressure generated by steaming in the core following a LOCA so that the core remains sufficiently covered. Inspection and manual actuation of the internals vent valves (1) ensure OPERABILITY, (2) ensure that the valves are not open during normal operation which would allow coolant flow to bypass the core, and (3) demonstrate that the valves begin to open and are fully open at the forces equivalent to the differential pressures assumed in the safety analysis.

Pages 4-60 through 4-65
DELETED

Amendment No. 25



REACTOR COOLANT FLOW

CURVE	(LBS/HR)	POWER	PUMPS OPERATING (TYPE OF LIMIT)
1	139.8×10^6 (100%)*	112%	Four Pumps (DNBR Limit)
2	104.5×10^6 (74.7%)	86.7%	Three Pumps (DNBR Limit)
3	68.8×10^6 (49.2%)	59.1%	One Pump in Each Loop (Quality Limit)

*106.5% of Cycle 1 Design Flow

TMI-1, UNIT 1, CYCLE 2
CORE PROTECTION SAFETY

Figure 2.1-3

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AMENDMENT NO. 25 TO FACILITY OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY
JERSEY CENTRAL POWER AND LIGHT COMPANY
PENNSYLVANIA ELECTRIC COMPANY

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

Introduction

Three Mile Island Nuclear Station, Unit No. 1 (TMI-1) commenced Cycle 2 operation on May 24, 1976. By phone call on June 4, 1976 and by letter dated June 5, 1976, Metropolitan Edison Company (MetEd) informed us of the improper incorporation of fuel densification penalties into both the TMI-1 Cycle 2 Reload Report submitted February 11, 1976 and the resultant TMI-1 Technical Specifications issued May 18, 1976. MetEd also stated that this error could be more than compensated for by taking credit for elimination of a currently assumed internals vent valve flow penalty.

By letter dated July 7, 1976, MetEd submitted a Technical Specification change request. This request was modified by MetEd's letters dated October 19, 1976 and January 31, 1977. This change will properly incorporate densification and rod bowing penalties, eliminate the vent valve penalty and incorporate vent valve surveillance requirements.

Evaluation

By letter dated March 10, 1976, we informed MetEd that, based on our review of the Babcock & Wilcox (B&W) report "B&W Operating Experience of Reactor Internals Vent Valves," we concluded that vent valves on B&W plants will remain closed during normal operation and that facilities incorporating a vent valve surveillance requirement need not include a vent valve flow penalty in their safety analysis. The necessary surveillance requirement is a check of the vent valves each refueling outage to confirm that none are stuck open and that each exhibits freedom of movement. Based on this previous evaluation, an enclosure to our March 10 letter, we conclude that elimination of the 4.6% internals vent valve flow penalty for TMI-1 is acceptable.

In addition, we have determined that, due to the assumption in the Final Safety Analysis Report (FSAR) that these valves do operate, the Technical Specifications of B&W facilities should require that the vent valves be demonstrated to be operable and that acceptance criteria should be included for the forces, as specified in the FSAR, necessary to operate the vent valves. Since the specifications associated with elimination of the vent valve penalty are closely related to these operability requirements, a change to the proposed vent valve surveillance requirements, to satisfy both areas, has been discussed with and agreed to by MetEd.

In their July 7, 1976, submittal MetEd states that the error found in the TMI-1, Cycle 2 departure from nucleate boiling ratio (DNBR) densification penalty calculations resulted from the use of inconsistent heat flux (flux shape) and enthalpy rise in evaluating the DNBR densification penalty. This error only affects the pressure-temperature envelope and flux/flow ratio. MetEd also states that a revised densification analysis indicates that the correct penalities are 5.93% DNBR (versus 1.88% in the Reload Report) and 3.47% power peaking relative to DNBR (versus 1.06% quoted in the Reload Report). The proper incorporation of densification penalties will tend to make affected limits, i.e. flux-flow and variable low pressure trip setpoints, more restrictive.

Recently, Westinghouse Electric Corporation presented data to the NRC staff which showed that previously developed methods for accounting for the effect of fuel rod bowing on departure from nucleate boiling may not contain adequate thermal margin when unheated rods (such as thimble tubes) are present. We have evaluated the impact of the Westinghouse data on all operating pressurized water reactors (PWR's). Models for treating the effects of fuel rod bowing on thermal-hydraulic performance have been derived for all PWR's. The models are based on the propensity of the individual fuel designs to bow and on the thermal analysis methods used to predict the coolant conditions for both normal operation and anticipated transients.

We have reviewed the extent of rod bowing which occurs with B&W fuel. Based on this review, an equation was derived for the clearance reduction between fuel rods due to fuel rod bowing as a function of burnup:

$$\frac{\Delta C}{Co} = a + b\sqrt{Bu}$$

where $\frac{\Delta C}{Co}$ is the fractional amount of closure

Bu is the bundle average burnup, and a,b are empirical constants fitted to B&W rod bow data.

The reduction in DNBR due to fuel rod bowing is assumed to vary linearly with the reduction in clearance between the fuel rods (or fuel rod and thimble rod) but can never be lower than that due to the pitch reduction factor used in the thermal analysis. For B&W reactors the DNBR penalty for end of third cycle has been calculated to be 11.2% DNBR.

By letter dated October 19, 1976, MetEd presented their available margins to offset the DNBR rod bow penalty for TMI-1. The total margin after correction of the densification penalty and elimination of the vent valve penalty, as discussed above, is 15.5% DNBR. We agree with the available margins as presented by MetEd and therefore conclude that no reduction in DNBR due to rod bowing effects is required.

The variable low pressure trip setpoint for Cycle 2 operation is based on the pressure-temperature limit curve for four pump operation shown as Curve 1 in Figure 2.1-3 of the Technical Specifications. This curve currently incorporates the open vent valve penalty. Curves 2 and 3 represent the corresponding limits for 3 and 2 pump operation, respectively, and do not incorporate the vent valve penalty. Proper incorporation of densification and rod bow penalties makes these curves more restrictive; however, taking credit for elimination of the vent valve penalty has the opposite effect. The summation of imposed penalties and available margins, as discussed above, results in Curve 1 remaining the same as is currently in the Technical Specifications. Accordingly, the variable low pressure trip setpoint remains the same. The revised Curves 2 and 3 have incorporated only the rod bow and densification penalties and, therefore, have moved to the left (more restrictive).

We conclude that the existing four pump pressure-temperature curve and variable low pressure trip setpoint are correct considering proper incorporation of densification and rod bow penalties and elimination of the vent valve penalty. Furthermore, we conclude that the revised pressure-temperature curves for two and three pump operation indicate the corrected pressure-temperature relationship and are acceptable.

The current flux/flow trip setpoint for Cycle 2 is 1.08. MetEd has demonstrated that when the correct densification and rod bow penalties are incorporated and the vent valve penalty is eliminated, the thermal-hydraulic limiting flux/flow setpoint is greater than 1.12. This value must be 1.11 or greater to justify the trip setpoint of 1.08; therefore, we conclude that the flux/flow trip setpoint of 1.08 in the current Technical Specifications is acceptable.

Presently TMI-1 is operating with Technical Specifications made conservative by taking credit for elimination of the vent valve penalty in conjunction with correcting densification and rod bow penalties. These corrections, however, are not a part of the analyses upon which the current Technical Specifications are based. The proposed change will correct these analyses by properly incorporating densification and rod bow penalties, eliminating the vent valve penalty, and adding vent valve surveillance requirements which we have previously found to be an acceptable alternative to incorporating a vent valve flow penalty.

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4) that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: March 7, 1977