November 17, 1987

Docket Nos.: 50-361 and 50-362

Mr. Kenneth P. Baskin
Vice President
Southern California Edison Company
2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770

Mr. James C. Holcombe
Vice President - Power Supply
San Diego Gas & Electric Company
101 Ash Street
Post Office Box 1831
San Diego, California 92112

Gentlemen:

SUBJECT: ISSUANCE OF AMENDMENT NO. 62 TO FACILITY OPERATING LICENSE NPF-10 AND AMENDMENT NO. 51 TO FACILITY OPERATING LICENSE NPF-15 SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 (TACS 66001 AND 66002)

The Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 62 to Facility Operating License No. NPF-10 and Amendment No. 51 to Facility Operating License No. NPF-15 for the San Onofre Nuclear Generating Station, Units 2 and 3, located in San Diego County, California. The amendments revise Technical Specification 3/4.2.7, "Axial Shape Index" and its associated bases.

These amendments revise the Axial Shape Index limit to support extended fuel cycle operation, and were requested by your letters of August 5, 1987 and September 18, 1987. These amendments cover Proposed Change Number PCN-237.

Sincerely,

/s/

Harry Rood, Senior Project Manager
Project Directorate V
Division of Reactor Projects - III,
IV, V and Special Projects

Enclosures:
1. Amendment No. 62 to NPF-10
2. Amendment No. 51 to NPF-15
3. Safety Evaluation

cc: See next page

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11/4/87	11/4/87	11/10/87	11/17/87

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ISSUANCE OF AMENDMENT NO. 62 TO FACILITY OPERATING LICENSE NPF-10
AND AMENDMENT NO. 51 TO FACILITY OPERATING LICENSE NPF-15
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DISTRIBUTION

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

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These amendments revise the Axial Shape Index limit to support extended fuel cycle operation, and were requested by your letters of August 5, 1987 and September 18, 1987. These amendments cover Proposed Change Number PCN-237.

Sincerely,

Harry Rood

Harry Rood, Senior Project Manager
Project Directorate V
Division of Reactor Project - III,
IV, V and Special Projects

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1. Amendment No. 62 to NPF-10
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3. Safety Evaluation

cc: See next page

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c/o U. S. Nuclear Regulatory Commission
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Government Publications Section
Library & Courts Building
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San Clemente, CA 92672

Chairman, Board Supervisors
San Diego County
1600 Pacific Highway, Room 335
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California Department of Health
ATTN: Chief, Environmental
Radiation Control Unit
Radiological Health Section
714 P Street, Room 498
Sacramento, CA 95814

Mr. John Hickman
Radiological Health Branch
State Department of Health Services
714 P Street, Building #8
Sacramento, California 95814

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

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

THE CITY OF ANAHEIM, CALIFORNIA

DOCKET NO. 50-361

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 62
License No. NPF-10

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

   A. The applications for amendment to the license for San Onofre Nuclear Generating Station, Unit 2 (the facility) filed by the Southern California Edison Company (SCE) on behalf of itself and San Diego Gas and Electric Company, The City of Riverside and The City of Anaheim, California (licensees) dated August 5, 1987, and September 18, 1987 comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the applications, as amended, the provisions of the Act, and the 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 set forth in 10 CFR Chapter I;

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

   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 amendment and Paragraph 2.C(2) of Facility Operating License No. NPF-10 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 62, are hereby incorporated in the license. SCE shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The changes in Technical Specifications are to become effective within 30 days of issuance of the amendment. In the period between issuance of the amendment and the effective date of the new Technical Specifications, the licensees shall adhere to the Technical Specifications existing at the time. The period of time during change over shall be minimized.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Charles M. Trammell for

George W. Knighton, Director
Project Directorate V
Division of Reactor Projects - III, IV, V and Special Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications

Date of Issuance: November 17, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 62

FACILITY OPERATING LICENSE NO. NPF-10

DOCKET NO. 50-361

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. Also to be replaced are the following overleaf pages to the amended pages.

Amendment Pages	Overleaf Pages
3/4 2-11	3/4 2-12
B3/4 2-4	B3/4 2-3
B3/4 2-5	

POWER DISTRIBUTION LIMITS

AXIAL SHAPE INDEX

LIMITING CONDITION FOR OPERATION

3.2.7 The core average AXIAL SHAPE INDEX (ASI) shall be maintained within the following limits:

a. COLSS OPERABLE
$-0.27 \leq ASI \leq + 0.27$

a. COLSS OUT OF SERVICE (CPC)
$-0.20 \leq ASI \leq + 0.20$

APPLICABILITY: MODE 1 above 20% of RATED THERMAL POWER*

ACTION:

With the core average AXIAL SHAPE INDEX (ASI) exceeding its limit, restore the ASI to within its limit within 2 hours or reduce THERMAL POWER to less than 20% of RATED THERMAL POWER within the next 4 hours.

SURVEILLANCE REQUIREMENTS

4.2.7 The core average AXIAL SHAPE INDEX shall be determined to be within its limit by continuously monitoring the ASI with COLSS, or with COLSS OUT OF SERVICE, by verifying at least once per 12 hours that the core average ASI is within the COLSS OUT OF SERVICE ASI limit using any operable CPC channel.

*See Special Test Exception 3.10.2.

POWER DISTRIBUTION LIMITS

PRESSURIZER PRESSURE

LIMITING CONDITION FOR OPERATION

3.2.8 The average pressurizer pressure shall be maintained between 2025 psia and 2275 psia.

APPLICABILITY: MODE 1

ACTION:

With the average pressurizer pressure exceeding its limit, restore the pressure to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 4 hours.

SURVEILLANCE REQUIREMENTS

4.2.8 The average pressurizer pressure shall be determined to be within its limit at least once per 12 hours.

AZIMUTHAL POWER TILT - T_q (Continued)

T_q is the peak fractional tilt amplitude at the core periphery

g is the radial normalizing factor

θ is the azimuthal core location

θ_o is the azimuthal core location of maximum tilt

P_{tilt}/P_{untilt} is the ratio of the power at a core location in the presence of a tilt to the power at that location with no tilt.

3/4.2.4 DNBR MARGIN

The limitation on DNBR as a function of AXIAL SHAPE INDEX represents a conservative envelope of operating conditions consistent with the safety analysis assumptions and which have been analytically demonstrated adequate to maintain an acceptable minimum DNBR throughout all anticipated operational occurrences, of which the loss of flow transient is the most limiting. Operation of the core with a DNBR at or above this limit provides assurance that an acceptable minimum DNBR will be maintained in the event of a loss of flow transient.

Either of the two core power distribution monitoring systems, the Core Operating Limit Supervisory System (COLSS) and the DNBR channels in the Core Protection Calculators (CPCs), provide adequate monitoring of the core power distribution and are capable of verifying that the DNBR does not violate its limits. The COLSS performs this function by continuously monitoring the core power distribution and calculating a core operating limit corresponding to the allowable minimum DNBR. The COLSS calculation of core power-operating limit based on the minimum DNBR limit includes appropriate penalty factors which provide, with a 95/95 probability/confidence level, that the core power limit calculated by COLSS (based on the minumum DNBR limit) is conservative with respect to the actual core power limit. These penalty factors are determined from the uncertainties associated with planar radial peaking measurement, engineering design factors, state parameter measurement, software algorithm modelling, computer processing, rod bow and core power measurement.

Parameters required to maintain the margin to DNB and total core power are also monitored by the CPCs. In the event that the COLSS is not being used, the DNBR margin can be maintained by monitoring with any operable CPC channel so that the DNBR remains above the predetermined limit as a function of Axial Shape Index. The above listed uncertainty penalty factors are also included in the CPCs, which assume a minimum of 20% of RATED THERMAL POWER. The 20% RATED THERMAL POWER threshold is due to the excore neutron flux detector system being less accurate below 20% core power. Core noise level at low power is too large to obtain usable detector readings. The additional uncertainty terms taken into account in the CPCs for transient protection are removed from Figures 3.2-1 and 3.2-2 since the curves are intended to monitor the LCO only during steady state operation.

DNBR Margin (Continued)

The DNBR penalty factors listed in section 4.2.4.4 are penalties used to accommodate the effects of rod bow. The amount of rod bow in each assembly is dependent upon the average burnup experienced by that assembly. Fuel assemblies that incur higher average burnup will experience a greater magnitude of rod bow. Conversely, lower burnup assemblies will experience less rod bow. The penalty for each batch required to compensate for rod bow is determined from a batch's maximum average assembly burnup applied to the batch's maximum integrated planar-radial power peak. A single net penalty for COLSS and CPC is then determined from the penalties associated with each batch, accounting for the offsetting margins due to the lower radial power peaks in the higher burnup batches.

3/4.2.5 RCS FLOW RATE

This specification is provided to ensure that the actual RCS total flow rate is maintained at or above the minimum value used in the LOCA safety analyses.

3/4.2.6 REACTOR COOLANT COLD LEG TEMPERATURE

This specification is provided to ensure that the actual value of reactor coolant cold leg temperature is maintained within the range of values used in the safety analyses.

2.4.2.7 AXIAL SHAPE INDEX

The Axial Shape Index (ASI) is a measure of the power generated in the lower half of the core less the power generated in the upper half of the core divided by the sum of these powers. This specification is provided to ensure that the core average ASI is maintained within the range of values assumed as an initial condition in the safety analyses. This range is specified as $-0.3 \leq ASI \leq 0.3$.

The ASI can be determined by utilizing either the Core Operating Limit Supervisory System (COLSS) or any operable Core Protection Calculator (CPC) channel. The real time monitoring capability and accuracy of COLSS allows COLSS to monitor power limit margins closely. Consequently, the ASI limit is broader than it would be with the same core without COLSS. The COLSS continuously calculates the ASI and compares the calculated value to the parameter established for the COLSS ASI alarm limit. In addition, there is an uncertainty associated with the COLSS calculated ASI; therefore the COLSS ASI alarm limit includes this uncertainty. If the LCO is exceeded, COLSS alarms are initiated. The ASI safety setting is selected so that no safety limit will be exceeded as a result of an anticipated operational occurrence, and so that the consequence of a design basis accident will be acceptable.

AXIAL SHAPE INDEX (Continued)

With COLSS out of service, any operable CPC channel may be used to calculate the ASI (using three axially spaced excore detectors). The axial shape synthesis in the CPC's shows the relative power produced as a function of core height in each third of the core. Due to the uncertainty associated with the CPC estimate, the ASI is restricted to a smaller range than the range calculated using the COLSS.

The 20% rated thermal power threshold is imposed due to the inaccuracy of the neutron flux detector below the threshold. Core noise level is too large to obtain usable detector readings.

3/4.2.8 PRESSURIZER PRESSURE

This specification is provided to ensure that the actual value of pressurizer pressure is maintained within the range of values used in the safety analyses.

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

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

THE CITY OF ANAHEIM, CALIFORNIA

DOCKET NO. 50-362

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 51
License No. NPF-15

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

   A. The applications for amendment to the license for San Onofre Nuclear Generating Station, Unit 3 (the facility) filed by the Southern California Edison Company (SCE) on behalf of itself and San Diego Gas and Electric Company, The City of Riverside and The City of Anaheim, California (licensees) dated August 5, 1987, and September 18, 1987 comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the applications, as amended, the provisions of the Act, and the 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 set forth in 10 CFR Chapter I;

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

   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 amendment and Paragraph 2.C(2) of Facility Operating License No. NPF-15 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 51, are hereby incorporated in the license. SCE shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The changes in Technical Specifications are to become effective upon initial startup for Cycle 4 of operation. In the period between issuance of the amendment and the effective date of the new Technical Specifications, the licensees shall adhere to the Technical Specifications existing at the time. The period of time during change over shall be minimized.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Charles M. Trammell for
George W. Knighton, Director
Project Directorate V
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 17, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 51

FACILITY OPERATING LICENSE NO. NPF-15

DOCKET NO. 50-362

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. Also to be replaced are the following overleaf pages to the amended pages.

Amendment Page	Overleaf Page
3/4 2-11	3/4 2-12
B3/4 2-4	B3/4 2-3
B3/4 2-5	-

POWER DISTRIBUTION LIMITS

AXIAL SHAPE INDEX

LIMITING CONDITION FOR OPERATION

3.2.7 The core average AXIAL SHAPE INDEX (ASI) shall be maintained within the following limits:

a. COLSS OPERABLE
$-0.27 \leq ASI \leq +0.27$

a. COLSS OUT OF SERVICE (CPC)
$-0.20 \leq ASI \leq +0.20$

APPLICABILITY: MODE 1 above 20% of RATED THERMAL POWER*

ACTION:

With the core average AXIAL SHAPE INDEX (ASI) exceeding its limit, restore the ASI to within its limit within 2 hours or reduce THERMAL POWER to less than 20% of RATED THERMAL POWER within the next 4 hours.

SURVEILLANCE REQUIREMENTS

4.2.7 The core average AXIAL SHAPE INDEX shall be determined to be within its limit by continuously monitoring the ASI with COLSS, or with COLSS OUT OF SERVICE, by verifying at least once per 12 hours that the core average ASI is within the COLSS OUT OF SERVICE ASI limit using any operable CPC channel.

*See Special Test Exception 3.10.2.

POWER DISTRIBUTION LIMITS

PRESSURIZER PRESSURE

LIMITING CONDITION FOR OPERATION

3.2.8 The pressurizer pressure shall be maintained between 2025 psia and 2275 psia.

APPLICABILITY: MODE 1

ACTION:

With the pressurizer pressure exceeding its limit, restore the pressure to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 4 hours.

SURVEILLANCE REQUIREMENTS

4.2.8 The pressurizer pressure shall be determined to be within its limit at least once per 12 hours.

AZIMUTHAL POWER TILT - T_q (Continued)

T_q is the peak fractional tilt amplitude at the core periphery

g is the radial normalizing factor

θ is the azimuthal core location

θ_o is the azimuthal core location of maximum tilt

P_{tilt}/P_{untilt} is the ratio of the power at a core location in the presence of a tilt to the power at that location with no tilt.

3/4.2.4 DNBR MARGIN

The limitation on DNBR as a function of AXIAL SHAPE INDEX represents a conservative envelope of operating conditions consistent with the safety analysis assumptions and which have been analytically demonstrated adequate to maintain an acceptable minimum DNBR throughout all anticipated operational occurrences, of which the loss of flow transient is the most limiting. Operation of the core with a DNBR at or above this limit provides assurance that an acceptable minimum DNBR will be maintained in the event of a loss of flow transient.

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DNBR Margin (Continued)

A DNBR penalty factor has been included in the COLSS and CPC DNBR calculation to accommodate the effects of rod bow. The amount of rod bow in each assembly is dependent upon the average burnup experienced by that assembly. Fuel assemblies that incur higher average burnup will experience a greater magnitude of rod bow. Conversely, lower burnup assemblies will experience less rod bow. In design calculations, the penalty for each batch required to compensate for rod bow is determined from a batch's maximum average assembly burnup applied to the batch's maximum integrated planar-radial power peak. A single net penalty for COLSS and CPC is then determined from the penalties associated with each batch, accounting for the offsetting margins due to the lower radial power peaks in the higher burnup batches.

3/4.2.5 RCS FLOW RATE

This specification is provided to ensure that the actual RCS total flow rate is maintained at or above the minimum value used in the LOCA safety analyses.

3/4.2.6 REACTOR COOLANT COLD LEG TEMPERATURE

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The ASI can be determined by utilizing either the Core Operating Limit Supervisory System (COLSS) or any operable Core Protection Calculator (CPC) channel. The real time monitoring capability and accuracy of COLSS allows COLSS to monitor power limit margins closely. Consequently, the ASI limit is broader than it would be with the same core without COLSS. The COLSS continuously calculates the ASI and compares the calculated value to the parameter established for the COLSS ASI alarm limit. In addition, there is an uncertainty associated with the COLSS calculated ASI, therefore the COLSS ASI alarm limit includes this uncertainty. If the LCO is exceeded, COLSS alarms are initiated. The ASI safety setting is selected so that no safety limit will be exceeded as a result of an anticipated operational occurrence, and so that the consequence of a design basis accident will be acceptable.

BASES

AXIAL SHAPE INDEX (Continued)

With COLSS out of service, any operable CPC channel may be used to calculate the ASI (using three axially spaced excore detectors). The axial shape synthesis in the CPC's shows the relative power produced as a function of core height in each third of the core. Due to the uncertainty associated with the CPC estimate, the ASI is restricted to a smaller range than the range calculated using the COLSS.

The 20% rated thermal power threshold is imposed due to the inaccuracy of the neutron flux detector below the threshold. Core noise level is too large to obtain usable detector readings.

3/4.2.8 PRESSURIZER PRESSURE

This specification is provided to ensure that the actual value of pressurizer pressure is maintained within the range of values used in the safety analyses.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 62 TO FACILITY OPERATING LICENSE NO. NPF-10

AND AMENDMENT NO. 51 TO FACILITY OPERATING LICENSE NO. NPF-15

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL.

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 & 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By letters dated August 5, 1987 and September 18, 1987, Southern California Edison Company (SCE), the managing licensee, submitted a proposed change to the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 Technical Specifications. The proposed change would revise Technical Specification 3/4.2.7, "Axial Shape Index" and its associated Bases by revising the numerical limits of axial shape index (ASI) when it is monitored with the core operating limit supervisory system (COLSS). The Surveillance Requirement associated with this specification would also be revised to require the core average ASI to be monitored continuously when using COLSS to assure that it is within its alarm limit. The ASI is defined as the power generated in the lower half of the core less the power generated in the upper half of the core divided by the sum of these powers and can be calculated using either the COLSS or any operable core protection calculator (CPC) channel.

2.0 EVALUATION DESCRIPTION

Technical Specification 3/4.2.7 currently states that the ASI must be maintained within the limits of -0.28 to +0.28 when monitoring with the COLSS. The COLSS continuously calculates the ASI and compares the calculated value to that established for the COLSS ASI alarm limits. These limits are based on the range assumed in the safety analyses (-0.3 to +0.3) and reduced by the ASI uncertainty of ±0.02 calculated for Cycle 3. This uncertainty will increase to ±0.03 for Cycle 4 due primarily to the effect of increased cycle length on the measurement uncertainties associated with the incore detectors which supply input to the COLSS. To reflect this change, the Technical Specification limits are changed to -0.27 to +0.27 for Cycle 4 and subsequent cycles of operation. The staff has reviewed the proposed change and finds it acceptable because it constitutes an additional restriction on plant operation that is necessitated by the extended duration of Cycle 4 and subsequent cycles. The staff also concludes that the change to the surveillance requirement, TS 4.2.7, to require continuous monitoring of the core average ASI when using COLSS, is also more restrictive than the current requirement for monitoring once every 12 hours and is acceptable.

3.0 CONTACT WITH STATE OFFICIAL

The NRC staff has advised the Chief of the Radiological Health Branch, State Department of Health Services, State of California, of the proposed determination of no significant hazards consideration. No comments were received.

4.0 ENVIRONMENTAL CONSIDERATION

These amendments involve changes to the installation or use of facilities' components located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The staff has determined that the amendments involve 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 exposure. The NRC staff has made a determination that the amendments involve no significant hazards consideration, and there has been no public comment on such finding. Accordingly, the amendments meet 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 these amendments.

5.0 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 operaton in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: November 17, 1987