November 9, 1989

Docket Nos. 50-361 and 50-362

Mr. Harold B. Ray
Vice President
Southern California Edison Company
Irvine Operations Center
23 Parker
Irvine, California 92718

Mr. Gary D. Cotton
Senior Vice President
Engineering and Operations
San Diego Gas & Electric Company
101 Ash Street
P.O. Box 1831
San Diego, California 92112

Gentlemen:

SUBJECT: ISSUANCE OF AMENDMENT NO. 78 TO FACILITY OPERATING LICENSE NO. NPF-10 AND AMENDMENT NO. 66 TO FACILITY OPERATING LICENSE NO. NPF-15 SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 (TAC NOS. 74177 AND 74178)

The Commission has issued the enclosed amendments to Facility Operating Licenses No. NPF-10 and No. NPF-15 for San Onofre Nuclear Generating Station, Units 2 and 3, respectively. The amendments consist of changes to the Technical Specifications in response to your application dated July 31, 1989 (PCN-295).

The amendments revise Technical Specification 3/4.1.3.4, "CEA Drop Time" and its associated Bases, to use both an arithmetic average control element assembly (CEA) drop time and a maximum individual CEA drop time. The maximum individual CEA drop time restriction would be used to limit the CEA drop time distribution from the arithmetic average.

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

Sincerely,

original signed by Lawrence Kokajko
Lawrence E. Kokajko, Project Manager
Project Directorate V
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 78 to License No. NPF-10
2. Amendment No. 66 to License No. NPF-15
3. Safety Evaluation

cc w/enclosures:
See next page

[AMEND 73199/73200]

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

November 9, 1989

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The amendments revise Technical Specification 3/4.1.3.4, "CEA Drop Time" and its associated Bases, to use both an arithmetic average control element assembly (CEA) drop time and a maximum individual CEA drop time. The maximum individual CEA drop time restriction would be used to limit the CEA drop time distribution from the arithmetic average.

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

Sincerely,

L. E. Kokajko

Lawrence E. Kokajko, Project Manager
Project Directorate V
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 78 to License No. NPF-10
2. Amendment No. 66 to License No. NPF-15
3. Safety Evaluation

cc w/enclosures:
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AMENDMENT NO. TO FACILITY OPERATING LICENSE NO.

Docket File
NRC & Local PDR
Plant File
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OGC
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E. Jordan (MNBB 3302)
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T. Meek (8) (P1-137)
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ACRS (10)
GPA/PA
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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 NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 78
License No. NPF-10

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

   A. The application for amendment to the license for San Onofre Nuclear Generating Station, Unit 2 (the facility) filed by Southern California Edison Company (SCE) on behalf of itself and San Diego Gas and Electric Company, the City of Riverside, California and the City of Anaheim, California (licensees) dated July 31, 1989 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's 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 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-10 is hereby amended to read as follows:

   (2) Technical Specification

   The Technical Specifications contained in Appendix A, and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 78, are hereby incorporated in the license. SCE 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 and must be fully implemented no later than 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

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 9, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 78

FACILITY OPERATING LICENSE NO. NPF-10

DOCKET NO. 50-361

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by amendment number and contain marginal lines indicating the area of change. Also enclosed are the following overleaf pages to the amended pages.

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POSITION INDICATOR CHANNEL - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.3.3 At least one CEA Reed Switch Position Transmitter indicator channel shall be OPERABLE for each shutdown, regulating or part length CEA not fully inserted.

APPLICABILITY: MODES 3*, 4* and 5*.

ACTION:

With less than the above required position indicator channel(s) OPERABLE, immediately open the reactor trip breakers.

SURVEILLANCE REQUIREMENTS

4.1.3.3 Each of the above required CEA Reed Switch Position Transmitter indicator channel(s) shall be determined to be OPERABLE by performance of a CHANNEL FUNCTIONAL TEST at least once per 18 months.

* With the reactor trip breakers in the closed position.

CEA DROP TIME

LIMITING CONDITION FOR OPERATION

3.1.3.4 The full length (shutdown and regulating) CEA arithmetic average and the individual CEA drop times, from a withdrawn position greater than or equal to 145 inches, shall be within at least one of the limit sets of Table 3.1-1. The drop time shall be from when power is interrupted to the CEA drive mechanism until the CEA reaches its 90 percent insertion position with:

a. T_{avg} greater than or equal to 520°F, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. With either the arithmetic average CEA drop time OR any individual CEA drop time determined to exceed the limits, restore the CEA drop time to within the limits prior to proceeding to Modes 1 or 2.

SURVEILLANCE REQUIREMENTS

4.1.3.4.1 The CEA drop time of full length CEAs shall be demonstrated through measurement prior to reactor criticality:

a. For all CEAs following each removal and reinstallation of the vessel head,

b. For all CEAs following any maintenance on or modification to the CEA drive system which could affect the drop time of those specific CEAs, and

c. At least once per refueling interval.

4.1.3.4.2 For each CEA drop time measurement performed under surveillance 4.1.3.4.1, confirm that the appropriate CPC and COLSS addressable constant adjustments that conservatively bound both the arithmetic average CEA drop time AND the slowest individual CEA drop time measured have been made prior to reactor criticality.

TABLE 3.1-1

CEA Drop Time Limits
(Seconds)

SET	AVERAGE	INDIVIDUAL
I	$\leq$ 3.0	$\leq$ 3.2
II	$\leq$ 3.2	$\leq$ 3.4
III	$\leq$ 3.4	$\leq$ 3.6

BORATION SYSTEMS (Continued)

The water volume limits are specified relative to the top of the highest suction connection to the tank. (Water volume below this datum is not considered recoverable for purposes of this specification.) Vortexing, internal structures and instrument error are considered in determining the tank level corresponding to the specified water volume limits.

The OPERABILITY of one boron injection system during REFUELING ensures that this system is available for reactivity control while in MODE 6.

The limits on water volume and boron concentration of the RWST also ensure a pH value of greater than 7.0 for the solution recirculated within containment after a LOCA. This pH minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components. The maximum RWST volume is not specified since analysis of pH limits and containment flooding post-LOCA considered RWST overflow conditions.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of CEA misalignments are limited to acceptable levels.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original design criteria are met.

The ACTION statements applicable to a stuck or untrippable, CEA to two or more inoperable CEAs and to a large misalignment (greater than or equal to 19 inches) of two or more CEAs, require a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and in the event of a stuck or untrippable CEA, the loss of SHUTDOWN MARGIN.

For small misalignments (less than 19 inches) of the CEAs, there is 1) a small effect on the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, 2) a small effect on the available SHUTDOWN MARGIN, and 3) a small effect on the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with small misalignments of CEAs permits a one hour time interval during which attempts may be made to restore the CEA to within its alignment requirements. The one hour time limit is sufficient to (1) identify causes of a misaligned CEA, (2) take appropriate corrective action to realign the CEAs and (3) minimize the effects of xenon redistribution.

MOVABLE CONTROL ASSEMBLIES (Continued)

The CPCs provide protection to the core in the event of a large misalignment (greater than or equal to 19 inches) of a CEA by applying appropriate penalty factors to the calculation to account for the misaligned CEA. However, this misalignment would cause distortion of the core power distribution. This distribution may, in turn, have a significant effect on (1) the available SHUTDOWN MARGIN, (2) the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, and (3) the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with the large misalignment of a CEA requires a prompt realignment of the misaligned CEA.

The ACTION statements applicable to misaligned or inoperable CEAs include requirements to align the OPERABLE CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements bring the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in (1) local burnup, (2) peaking factors and (3) available shutdown margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

Operability of at least two CEA position indicator channels is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits. The CEA "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the ACTION statements applicable to inoperable CEA position indicators permit continued operations when the positions of CEAs with inoperable position indicators can be verified by the "Full In" or "Full Out" limits. Setting the "RSPT/CEAC Inoperable" addressable constant in the CPC's to indicate to the CPC's that one or both of the CEAC's is inoperable does not necessarily constitute the inoperability of the RSPT rod indications from the respective CEAC. Operability of the CEAC rod indications is determined from the normal surveillance.

CEA positions and OPERABILITY of the CEA position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCO's are satisfied.

The arithmetic average CEA drop time restrictions are consistent with the CEA drop times used in the safety analysis. The maximum individual CEA drop time restrictions are used to limit the CEA drop time distributions about the average. COLSS and CPC addressable constant adjustments have been conservatively

MOVABLE CONTROL ASSEMBLIES (Continued)

determined to accommodate these CEA drop time combinations. The appropriate set of adjustment factors that bound both the arithmetic average CEA drop time and the slowest individual CEA drop time are installed prior to criticality following the performance of the CEA drop time surveillance. Measurement with T_{avg} greater than or equal to 520°F and with all reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

Any fuel management change that significantly affects the core wide axial or radial power profiles, such as axial blankets or ultra-low leakage fuel management, will necessitate reverification of the average CEA drop time analysis. Changes that would significantly affect the CEA drop-time distribution, such as changes to the CEDM circuits, large increases in the core flow pressure drop, changes in the total drop weight of the CEAs or changes in the location of the CEAs, will require reverification of the average CEA drop-time concept. Barring these types of changes or failure to meet the new technical specification limits, reverification of the average drop-time analysis will not be required on a cycle-by-cycle basis.

The establishment of LSSS and LCOs require that the expected long and short term behavior of the radial peaking factors be determined. The long term behavior relates to the variation of the steady state radial peaking factors with core burnup and is affected by the amount of CEA insertion assumed, the portion of a burnup cycle over which such insertion is assumed and the expected power level variation throughout the cycle. The short term behavior relates to transient perturbations to the steady-state radial peaks due to radial xenon redistribution. The magnitudes of such perturbations depend upon the expected use of the CEAs during anticipated power reductions and load maneuvering. Analyses are performed based on the expected mode of operation of the NSSS (base load maneuvering, etc.) and from these analyses CEA insertions are determined and a consistent set of radial peaking factors defined. The Long Term Steady State and Short Term Insertion Limits are determined based upon the assumed mode of operation used in the analyses and provide a means of preserving the assumptions on CEA insertions used. The limits specified serve to limit the behavior of the radial peaking factors within the bounds determined from analysis. The actions specified serve to limit the extent of radial xenon redistribution effects to those accommodated in the analyses. The Long and Short Term Insertion Limits of Specification 3.1.3.6 are specified for the plant which has been designed for primarily base loaded operation but which has the ability to accommodate a limited amount of load maneuvering.

MOVABLE CONTROL ASSEMBLIES (Continued)

The Transient Insertion Limits of Specification 3.1.3.6 and the Shutdown CEA Insertion Limits of Specification 3.1.3.5 ensure that 1) the minimum SHUTDOWN MARGIN is maintained, and 2) the potential effects of a CEA ejection accident are limited to acceptable levels. Long term operation at the Transient Insertion Limits is not permitted since such operation could have effects on the core power distribution which could invalidate assumptions used to determine the behavior of the radial peaking factors.

The Part Length CEA Insertion Limits of Specification 3.1.3.7 ensure that adverse power shapes and rapid local power changes which affect radial peaking factors and DNB considerations do not occur as a result of a part length CEA group covering the same axial segment of the fuel assemblies for an extended period of time during operation.

The CEA fully withdrawn position is defined to be greater than or equal to 145 inches. The extreme limits of CEA travel, fully withdrawn and fully inserted, may be described as the upper electrical limit and lower electrical limit respectively.

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 NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 66
License No. NPF-15

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

   A. The application for amendment to the license for San Onofre Nuclear Generating Station, Unit 2 (the facility) filed by Southern California Edison Company (SCE) on behalf of itself and San Diego Gas and Electric Company, the City of Riverside, California and the City of Anaheim, California (licensees) dated July 31, 1989 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's 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 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-15 is hereby amended to read as follows:

   (2) Technical Specification

   The Technical Specifications contained in Appendix A, and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 66, are hereby incorporated in the license. SCE 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 and must be fully implemented no later than 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

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 9, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 66

FACILITY OPERATING LICENSE NO. NPF-15

DOCKET NO. 50-362

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by amendment number and contain marginal lines indicating the area of change. Also enclosed are the following overleaf pages to the amended pages.

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POSITION INDICATOR CHANNEL - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.3.3 At least one CEA Reed Switch Position Transmitter indicator channel shall be OPERABLE for each shutdown, regulating or part length CEA not fully inserted.

APPLICABILITY: MODES 3*, 4* and 5*.

ACTION:

With less than the above required position indicator channel(s) OPERABLE, immediately open the reactor trip breakers.

SURVEILLANCE REQUIREMENTS

4.1.3.3 Each of the above required CEA Reed Switch Position Transmitter indicator channel(s) shall be determined to be OPERABLE by performance of a CHANNEL FUNCTIONAL TEST at least once per 18 months.

*With the reactor trip breakers in the closed position.

CEA DROP TIME

LIMITING CONDITION FOR OPERATION

3.1.3.4 The full length (shutdown and regulating) CEA arithmetic average and the individual CEA drop times, from a withdrawn position greater than or equal to 145 inches, shall be within at least one of the limit sets of Table 3.1-1. The drop time shall be from when power is interrupted to the CEA drive mechanism until the CEA reaches its 90 percent insertion position with:

a. T_{avg} greater than or equal to 520°F, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. With either the arithmetic average CEA drop time OR any individual CEA drop time determined to exceed the limits, restore the CEA drop time to within the limits prior to proceeding to Modes 1 or 2.

SURVEILLANCE REQUIREMENTS

4.1.3.4.1 The CEA drop time of full length CEAs shall be demonstrated through measurement prior to reactor criticality:

a. For all CEAs following each removal and reinstallation of the vessel head,

b. For all CEAs following any maintenance on or modification to the CEA drive system which could affect the drop time of those specific CEAs, and

c. At least once per refueling interval.

4.1.3.4.2 For each CEA drop time measurement performed under surveillance 4.1.3.4.1, confirm that the appropriate CPC and COLSS addressable constant adjustments that conservatively bound both the arithmetic average CEA drop time AND the slowest individual CEA drop time measured have been made prior to reactor criticality.

TABLE 3.1-1

CEA Drop Time Limits
(Seconds)

SET	AVERAGE	INDIVIDUAL
I	$\leq$ 3.0	$\leq$ 3.2
II	$\leq$ 3.2	$\leq$ 3.4
III	$\leq$ 3.4	$\leq$ 3.6

BORATION SYSTEMS (Continued)

The water volume limits are specified relative to the top of the highest suction connection to the tank. (Water volume below this datum is not considered recoverable for purposes of this specification.) Vortexing, internal structures and instrument error are considered in determining the tank level corresponding to the specified water volume limits.

The OPERABILITY of one boron injection system during REFUELING ensures that this system is available for reactivity control while in MODE 6.

The limits on water volume and boron concentration of the RWST also ensure a pH value of greater than 7.0 for the solution recirculated within containment after a LOCA. This pH minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components. The maximum RWST volume is not specified since analysis of pH limits and containment flooding post-LOCA considered RWST overflow conditions.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of CEA misalignments are limited to acceptable levels.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original design criteria are met.

The ACTION statements applicable to a stuck or untrippable CEA, to two or more inoperable CEAs and to a large misalignment (greater than or equal to 19 inches) of two or more CEAs, require a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and in the event of a stuck or untrippable CEA, the loss of SHUTDOWN MARGIN.

For small misalignments (less than 19 inches) of the CEAs, there is 1) a small effect on the time-dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, 2) a small effect on the available SHUTDOWN MARGIN, and 3) a small effect on the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with small misalignments of CEAs permits a 1-hour time interval during which attempts may be made to restore the CEA to within its alignment requirements. The 1-hour time limit is sufficient to (1) identify causes of a misaligned CEA, (2) take appropriate corrective action to realign the CEAs and (3) minimize the effects of xenon redistribution.

MOVABLE CONTROL ASSEMBLIES (Continued)

The CPCs provide protection to the core in the event of a large misalignment (greater than or equal to 19 inches) of a CEA by applying appropriate penalty factors to the calculation to account for the misaligned CEA. However, this misalignment would cause distortion of the core power distribution. This distribution may, in turn, have a significant effect on (1) the available SHUTDOWN MARGIN, (2) the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, and (3) the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with the large misalignment of a CEA requires a prompt realignment of the misaligned CEA.

The ACTION statements applicable to misaligned or inoperable CEAs include requirements to align the OPERABLE CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements bring the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in (1) local burnup, (2) peaking factors and (3) available shutdown margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

Operability of at least two CEA position indicator channels is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits. The CEA "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the ACTION statements applicable to inoperable CEA position indicators permit continued operations when the positions of CEAs with inoperable position indicators can be verified by the "Full In" or "Full Out" limits.

CEA positions and OPERABILITY of the CEA position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCO's are satisfied.

The arithmetic average CEA drop time restrictions are consistent with the CEA drop times used in the safety analysis. The maximum individual CEA drop time restrictions are used to limit the CEA drop time distributions about the average. COLSS and CPC addressable constant adjustments have been conservatively determined to accommodate these CEA drop time combinations. The appropriate set of adjustment factors that bound both the arithmetic average CEA drop time and the slowest individual CEA drop time are installed prior to criticality following the performance of the CEA drop time

MOVABLE CONTROL ASSEMBLIES (Continued)

surveillance. Measurement with T_{avg} greater than or equal to 520°F and with all reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

Any fuel management change that significantly affects the core wide axial or radial power profiles, such as axial blankets or ultra-low leakage fuel management, will necessitate reverification of the average CEA drop-time analysis. Changes that would significantly affect the CEA drop-time distribution, such as changes to the CEDM circuits, large increases in the core flow pressure drop, changes in the total drop weight of the CEAs or changes in the location of the CEAs, will require reverification of the average CEA drop-time concept. Barring these types of changes or failure to meet the new technical specification limits, reverification of the average drop-time analysis will not be required on a cycle-by-cycle basis.

The establishment of LSSS and LCOs require that the expected long and short term behavior of the radial peaking factors be determined. The long term behavior relates to the variation of the steady-state radial peaking factors with core burnup and is affected by the amount of CEA insertion assumed, the portion of a burnup cycle over which such insertion is assumed and the expected power level variation throughout the cycle. The short term behavior relates to transient perturbations to the steady-state radial peaks due to radial xenon redistribution. The magnitudes of such perturbations depend upon the expected use of the CEAs during anticipated power reductions and load maneuvering. Analyses are performed based on the expected mode of operation of the NSSS (base load maneuvering, etc.) and from these analyses CEA insertions are determined and a consistent set of radial peaking factors defined. The Long Term Steady-State and Short Term Insertion Limits are determined based upon the assumed mode of operation used in the analyses and provide a means of preserving the assumptions on CEA insertions used. The limits specified serve to limit the behavior of the radial peaking factors within the bounds determined from analysis. The actions specified serve to limit the extent of radial xenon redistribution effects to those accommodated in the analyses. The Long and Short Term Insertion Limits of Specification 3.1.3.6 are specified for the plant which has been designed for primarily base loaded operation but which has the ability to accommodate a limited amount of load maneuvering.

The Transient Insertion Limits of Specification 3.1.3.6 and the Shutdown CEA Insertion Limits of Specification 3.1.3.5 ensure that 1) the minimum SHUTDOWN MARGIN is maintained, and 2) the potential effects of a CEA ejection

MOVABLE CONTROL ASSEMBLIES (Continued)

accident are limited to acceptable levels. Long term operation at the Transient Insertion Limits is not permitted since such operation could have effects on the core power distribution which could invalidate assumptions used to determine the behavior of the radial peaking factors.

The Part Length CEA Insertion Limits of Specification 3.1.3.7 ensure that adverse power shapes and rapid local power changes which affect radial peaking factors and DNB considerations do not occur as a result of a part length CEA group covering the same axial segment of the fuel assemblies for an extended period of time during operation.

The CEA fully withdrawn position is defined to be greater than or equal to 145 inches. The extreme limits of CEA travel, fully withdrawn and fully inserted, may be described as the upper electrical limit and lower electrical limit respectively.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 78 TO FACILITY OPERATING LICENSE NO. NPF-10

AND AMENDMENT NO. 66 TO FACILITY OPERATING LICENSE NO. NPF-15

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

THE CITY OF ANAHEIM, CALIFORNIA

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By letter dated July 31, 1989, Southern California Edison Company et al. (SCE or the licensee) submitted proposed changes to the Technical Specifications revising the control element assembly (CEA) drop-time limits for San Onofre Nuclear Generating Station, Unit Nos. 2 and 3 (SONGS 2/3). Specifically, the proposed amendment would expand Technical Specification 3/4.1.3.4 to include both an arithmetic average CEA drop time and a maximum individual CEA drop time. The maximum CEA drop time for any individual full-length CEA would be used to limit the CEA drop-time distribution from the arithmetic average.

These changes are necessary because the results of the SONGS-2 Cycle 4 startup testing showed that the maximum drop time for individual CEAs were longer than expected and were found to approach the Technical Specification maximum value. This adverse change in the measured CEA drop times was revealed by a new measurement methodology. The testing method used previously for measuring CEA drop times involved interrupting the power to each individual CEA gripper coil. The new test method, which is consistent with the actual CEA scram sequence, involved interrupting the power at the reactor trip breakers rather than the individual trip breakers. The additional delay time is associated with the difference between the electromagnetic decay time of multiple gripper coils and the decay time of an individual coil. The measurement of individual CEA drop times during a scram is made possible by the special computer software employed in plants with Core Protection Calculators (CPC), which initiates a CPC trip and simultaneously monitors the positions of all CEAs as a function of time.

A revised analysis of all events was made previously by the licensee to support a technical specification CEA drop-time increase from 3.0 seconds to 3.2 seconds. The revised analyses credited space-time kinetics in conjunction with the new CEA drop-time curve to calculate the time dependent scram reactivity insertion. The core operating limit supervisory system (COLSS) and the core protection calculator (CPC) power uncertainty penalty factors were also increased in support of the revised analyses.

As a result of the Cycle 4 drop-time testing, the margin between the slowest CEA and technical specification CEA drop time was quite small. Since failure to pass the CEA drop-time test precludes entering the startup operational mode, SCE would like to increase this margin before the Cycle 5 startup without any further penalties. The proposed method for increasing the time between the measured CEA drop time and the technical specification drop time of 3.2 seconds is to credit the measured spatial distribution of CEAs about an average position as opposed to the present safety analysis assumption that all CEAs drop at the same speed and, therefore, are at the same axial height as the slowest CEA. This proposed analysis method is evaluated below.

2.0 EVALUATION

The current SONGS 2/3 safety analyses assume that all CEAs drop into the core at the same time and at the same rate following a reactor trip. Therefore, every CEA is at the same axial height at any time during a trip. The drop time is assumed to be governed by the slowest CEA, which is limited to no longer than 3.2 seconds. Therefore, current Technical Specifications require that all CEAs fall within the 3.2 second drop time.

On the basis of the SONGS 2/3 measured CEA drop patterns presented by the licensee, the CEAs do not fall at the same time and at the same rate during a reactor trip, but have a spatial distribution about the average. The reactivity worth of a CEA is a function of the power or neutron flux environment surrounding the CEA. During a reactor trip, the faster CEAs will be in higher flux regions sooner and will, therefore, make a greater relative contribution to the net negative reactivity insertion than the slower CEAs. Therefore, the licensee contends that the negative reactivity insertion for any reasonable distribution of CEAs is more directly correlated to, and can be represented by, the average CEA insertion rather than by the slowest insertion.

Combustion Engineering (CE) has performed a set of three-dimensional space-time calculations using the NRC-approved HERMITE computer program. The staff has reviewed the initial conditions assumed in the HERMITE calculations and finds that they adequately cover the range of operating conditions and the limits of the as-measured CEA distributions. These calculations show that essentially the same reactivity will be inserted by CEAs falling in a reasonable distribution about an average CEA position as the reactivity inserted by all CEAs falling at the same average

position, the so-called "window shade" case. This is true for any reasonable family of CEA distributions similar to those measured at SONGS 2/3. However, if the distance between the fastest and slowest CEAs becomes too large or the distribution of CEAs deviates significantly from that modeled by CE in this study, then the average CEA position (window shade) may not be representative of the time dependent reactivity insertion. Therefore, a limit will be placed on the CEA drop-time distribution. This will be expressed as a maximum drop-time limit on the slowest CEA in the revised Technical Specifications. The revised Technical Specifications will actually have three average CEA drop-time criteria (3.0, 3.2, and 3.4 seconds) with corresponding maximum individual CEA drop-time criteria (3.2, 3.4, and 3.6 seconds). Different COLSS and CPC adjustment factors will be applied to accommodate each of these drop-time combinations as discussed below.

The licensee has reanalyzed the design-basis events that are potentially affected by the CEA drop-time change. The reanalyses indicate that an extra penalty has to be applied for several events to either the CPC margin-to-trip via the BERR1 addressable constant or to the COLSS margin via the EPOL2 or EPOL4 constants to offset the effect of an increased CEA drop time of greater than 3.2 seconds. Since the current safety analyses assume a CEA drop time of 3.2 seconds, no adjustments are needed for an average drop time of 3.2 seconds with a maximum individual CEA drop time of 3.4 seconds. In addition, a credit can be applied if the average CEA drop time is less than 3.0 seconds. Based on these reanalyses, the staff concurs that the effects of a longer CEA drop time can be accommodated by either the existing analyses or by appropriate COLSS and CPC penalties applied via addressable constants in accordance with Technical Specification 6.8.1. The proposed Technical Specification changes are therefore acceptable.

3.0 CONCLUSION

The staff has reviewed the proposed SONGS 2/3 Technical Specification changes. Instead of the present maximum CEA drop time of 3.2 seconds, the new specification would have three maximum drop times of 3.2, 3.4, and 3.6 seconds and corresponding average drop times of 3.0, 3.2, and 3.4 seconds. Based on the SONGS 2/3 CEA drop test data and the results of the CE calculations that were submitted to the staff, the time dependent reactivity insertion of a window shade scram at the average CEA drop time will provide essentially the same reactivity insertion as the more realistic distributed case about the same average. The staff finds the proposed changed to the Technical Specifications acceptable for SONGS 2/3 with the following conditions:

(1) Any fuel management change that significantly affects the core wide axial or radial power profiles, such as axial blankets or ultra-low leakage fuel management, will necessitate reverification of the average CEA drop-time analysis.

(2) Changes that would significantly affect the CEA drop-time distribution, such as changes to the CEDM circuits, large increases in the core flow pressure drop, changes in the total drop weight of the CEAs or changes in the location of the CEAs, will require reverification of the average CEA drop-time concept.

Barring these types of changes or failure to meet the new technical specification limits, reverification of the average drop time analysis will not be required on a cycle-by-cycle basis.

Per telephone conversation with the licensee on October 19, 1989, the licensee agreed that the associated Bases section should be modified to reflect the above conditions.

Therefore, based upon the above information, the staff finds the proposed modifications to the Technical Specifications, as detailed in a letter dated July 31, 1989, are acceptable.

4.0 CONTACT WITH STATE OFFICIAL

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

5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact have been prepared and published (54 FR 46661) in the Federal Register on November 6, 1989. Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

6.0 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 operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Laurence I. Kopp
Lawrence E. Kokajko

Dated: November 9, 1989

7590-01

UNITED STATES NUCLEAR REGULATORY COMMISSION

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL.

DOCKET NOS. 50-361 AND 50-362

NOTICE OF ISSUANCE OF AMENDMENTS TO

FACILITY OPERATING LICENSES

The U.S. Nuclear Regulatory Commission (Commission) has issued Amendment No.78 to Facility Operating License No. NPF-10 and Amendment No.66 to Facility Operating License No. NPF-15, issued to Southern California Edison Company, San Diego Gas and Electric Company, The City of Riverside, California and the City of Anaheim, California (the licensees), which revised the Technical Specifications for operation of the San Onofre Nuclear Generating Station, Units Nos. 2 and 3, located in San Diego County, California.

The amendments were effective as of the date of issuance.

These amendments revise Technical Specification 3/4.1.3.4, "CEA Drop Time" and its associated Bases, to use both as arithmetic average control element assembly (CEA) drop time and a maximum individual CEA drop time. The maximum individual CEA drop time restriction would be used to limit the CEA drop time distribution from the arithmetic average. The amendments are in response to an application for amendment dated July 31, 1989 and designated as PCN 295.

The application for amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations, The Commission has made appropriate findings as required by the Act and the Commission's regulations in 10 CFR Chapter I, which is set forth in the license amendments.

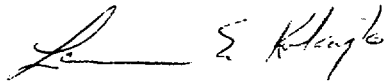
Notice of Consideration of Issuance of Amendments and Opportunity for Hearing in connection with this action was published in the FEDERAL REGISTER on September 7, 1989 (54 FR 37172). No request for a hearing or petition for leave to intervene was filed following this notice.

The Commission has prepared an Environmental Assessment related to the action and has determined that an environmental impact statement will not be prepared and that issuance of the amendment will have no significant adverse effect on the quality of the human environment.

For further details with respect to the action see (1) the application for amendments dated July 31, 1989 (2) Amendment No.78 to License No. NPF-10 and Amendment No. 66 to License No. NPF-15, (3) the Commission's related Safety Evaluation and (4) the Commission's Environmental Assessment. All of these items are available for public inspection at the Commission's Public Document Room, 2120 L Street NW., Washington, DC 20555, and the General Library, University of California, P. O. Box 19557, Irvine, California 92713. A copy of items (2), (3) and (4) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Director, Division of Reactor Projects III, IV, V and Special Projects.

Dated at Rockville, Maryland this 9th day of November, 1989.

FOR THE NUCLEAR REGULATORY COMMISSION



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