March 27, 1986

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. 43 to Facility Operating License NPF-10 and Amendment No. 32 to Facility Operating License NPF-15 San Onofre Nuclear Generating Station, Units 2 and 3

The Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 43 to Facility Operating License No. NPF-10 and Amendment No. 32 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 the technical specifications related to boric acid concentration and flow paths.

These amendments were requested by your letter of October 9, 1985, and are covered by Proposed Change Number PCN-200.

A copy of the Safety Evaluation supporting the amendments is also enclosed.

Sincerely,

George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing-B

Enclosures:
1. Amendment No. 43 to NPF-10
2. Amendment No. 32 to NPF-15
3. Safety Evaluation

cc: See next page

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HRood/yt	JLee		GWKnighton
3/14/86	3/25/86	3/18/86	3/27/86

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

Charles R. Kocher, Esq.
James A. Beoletto, Esq.
Southern California Edison Company
2244 Walnut Grove Avenue
P. O. Box 800
Rosemead, California 91770

Orrick, Herrington & Sutcliffe
ATTN: David R. Pigott, Esq.
600 Montgomery Street
San Francisco, California 94111

Alan R. Watts, Esq.
Rourke & Woodruff
Suite 1020
1055 North Main Street
Santa Ana, California, 92701

Mr. S. McClusky
Bechtel Power Corporation
P. O. Box 60860, Terminal Annex
Los Angeles, California 90060

Mr. C. B. Brinkman
Combustion Engineering, Inc.
7910 Woodmont Avenue, Suite 1310
Bethesda, Maryland 20814

Mr. Dennis F. Kirsh
U.S. Nuclear Regulatory Commission
Region V
1450 Maria Lane, Suite 210
Walnut Creek, California 94596

Mr. Hans Kaspar, Executive Director
Marine Review Committee, Inc.
531 Encinitas Boulevard, Suite 105
Encinitas, California 92024

Mr. Mark Medford
Southern California Edison Company
2244 Walnut Grove Avenue
P. O. Box 800
Rosemead, California 91770

Dr. L. Bernath
Manager, Nuclear Department
San Diego Gas & Electric Company
P. O. Box 1831
San Diego, California 92112

Richard J. Wharton, Esq.
University of San Diego School of Law
Environmental Law Clinic
San Diego, California 92110

Charles E. McClung, Jr., Esq.
Attorney at Law
24012 Calle de la Plaza/Suite 330
Laguna Hills, California 92653

Regional Administrator, Region V
U.S. Nuclear Regulatory Commission
1450 Maria Lane/Suite 210
Walnut Creek, California 94596

Resident Inspector, San Onofre NPS
c/o U. S. Nuclear Regulatory Commission
Post Office Box 4329
San Clemente, California 92672

cc:
California State Library
Government Publications Section
Library & Courts Building
Sacramento, CA 95841
ATTN: Ms. Mary Schnell

Mayor, City of San Clemente
San Clemente, CA 92672

Chairman, Board Supervisors
San Diego County
1600 Pacific Highway, Room 335
San Diego, CA 92101

California Department of Health
ATTN: Chief, Environmental
Radiation Control Unit
Radiological Health Section
714 P Street, Room 498
Sacramento, CA 95814

Mr. Joseph O. Ward, Chief
Radiological Health Branch
State Department of Health Services
714 P Street, Building #8
Sacramento, California 95814

ISSUANCE OF AMENDMENT NO.43 TO FACILITY OPERATING LICENSE NPF-10
AND AMENDMENT NO. 32 TO FACILITY OPERATING LICENSE NPF-15
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DISTRIBUTION

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NRC PDR
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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 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 43
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 the Southern California Edison Company on behalf of itself and San Diego Gas and Electric Company, The City of Riverside and the City of Anaheim, California (licensees) dated October 9, 1985, complies 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 application, 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. 43 , are hereby incorporated in the license. SCE shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This amendment is effective immediately and is to be fully implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing-B

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 27, 1986

ATTACHMENT TO LICENSE AMENDMENT NO. 43

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 contains 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 1-6	3/4 1-5
3/4 1-7	3/4 1-8
3/4 1-11	-
3/4 1-12	-
3/4 1-13	-
3/4 1-14	-
3/4 1-14a	-
3/4 5-1	3/4 5-2
3/4 5-8	3/4 5-7
B 3/4 1-2	B 3/4 1-1

MINIMUM TEMPERATURE FOR CRITICALITY

LIMITING CONDITION FOR OPERATION

3.1.1.4 The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be greater than or equal to 520°F.

APPLICABILITY: MODES 1 and 2#.

ACTION:

With a Reactor Coolant System operating loop temperature (T_{avg}) less than 520°F, restore T_{avg} to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.1.4 The Reactor Coolant System temperature (T_{avg}) shall be determined to be greater than or equal to 520°F:

a. Within 15 minutes prior to achieving reactor criticality, and

b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System T_{avg} is less than 535°F.

#With K_{eff} greater than or equal to 1.0.

3/4.1.2 BORATION SYSTEMS

FLOW PATH - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

a. A flow path from either boric acid makeup tank via either one of the boric acid makeup pumps, the blending tee or the gravity feed connection and any charging pump to the Reactor Coolant System if the boric acid makeup tank in Specification 3.1.2.7.a is OPERABLE, or

b. The flow path from the refueling water tank via either a charging pump or a high pressure safety injection pump to the Reactor Coolant System if the refueling water storage tank in Specification 3.1.2.7.b is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.1 At least one of the above required flow paths shall be demonstrated OPERABLE:

a. Intentionally deleted.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

FLOW PATHS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 The following boron injection flow paths to the RCS via the charging pumps(s) shall be OPERABLE:

a. At least one of the following combinations:

1) One boric acid makeup tank, with the tank contents in accordance with Figure 3.1-1, its associated gravity feed valve, and boric acid makeup pump.

2) Two boric acid makeup tanks, with the combined contents of the tanks in accordance with Figure 3.1-1, their associated gravity feed valves, and boric acid makeup pumps,

3) Two boric acid makeup tanks, each with contents in accordance with Figure 3.1-1, at least one gravity feed valve, and at least one boric acid makeup pump, and

b. The flow path from the refueling water storage tank.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With fewer than the above required boron injection flow paths to the Reactor Coolant System OPERABLE, restore the required boron injection flow paths to the Reactor Coolant System to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 3.0% delta k/k at 200°F within the next 6 hours; restore the required flow paths to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.2 The above required flow paths shall be demonstrated OPERABLE:

a. Intentionally deleted.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

c. At least once per 18 months during shutdown by verifying that each automatic valve in the flow path actuates to its correct position on a SIAS test signal.

CHARGING PUMP - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump or one high pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.3 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORIC ACID MAKEUP PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 The boric acid makeup pump(s) in the boron injection flow path(s) required OPERABLE pursuant to Specification 3.1.2.2a shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the boric acid makeup pump(s) required for the boron injection flow path(s) pursuant to Specification 3.1.2.2a inoperable, restore the boric acid makeup pump(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 3.0% delta k/k at 200°F; restore the above required boric acid makeup pump(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORATED WATER SOURCE - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.7 As a minimum, one of the following borated water sources shall be OPERABLE:

a. One boric acid makeup tank with a minimum boron concentration of 1720 ppm and a minimum borated water volume of 5150 gallons, or

b. The refueling water storage tanks with:

   1. A minimum borated water volume of 5150 gallons above the ECCS suction connection,

   2. A minimum boron concentration of 1720 ppm, and

   3. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.7 The above required borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

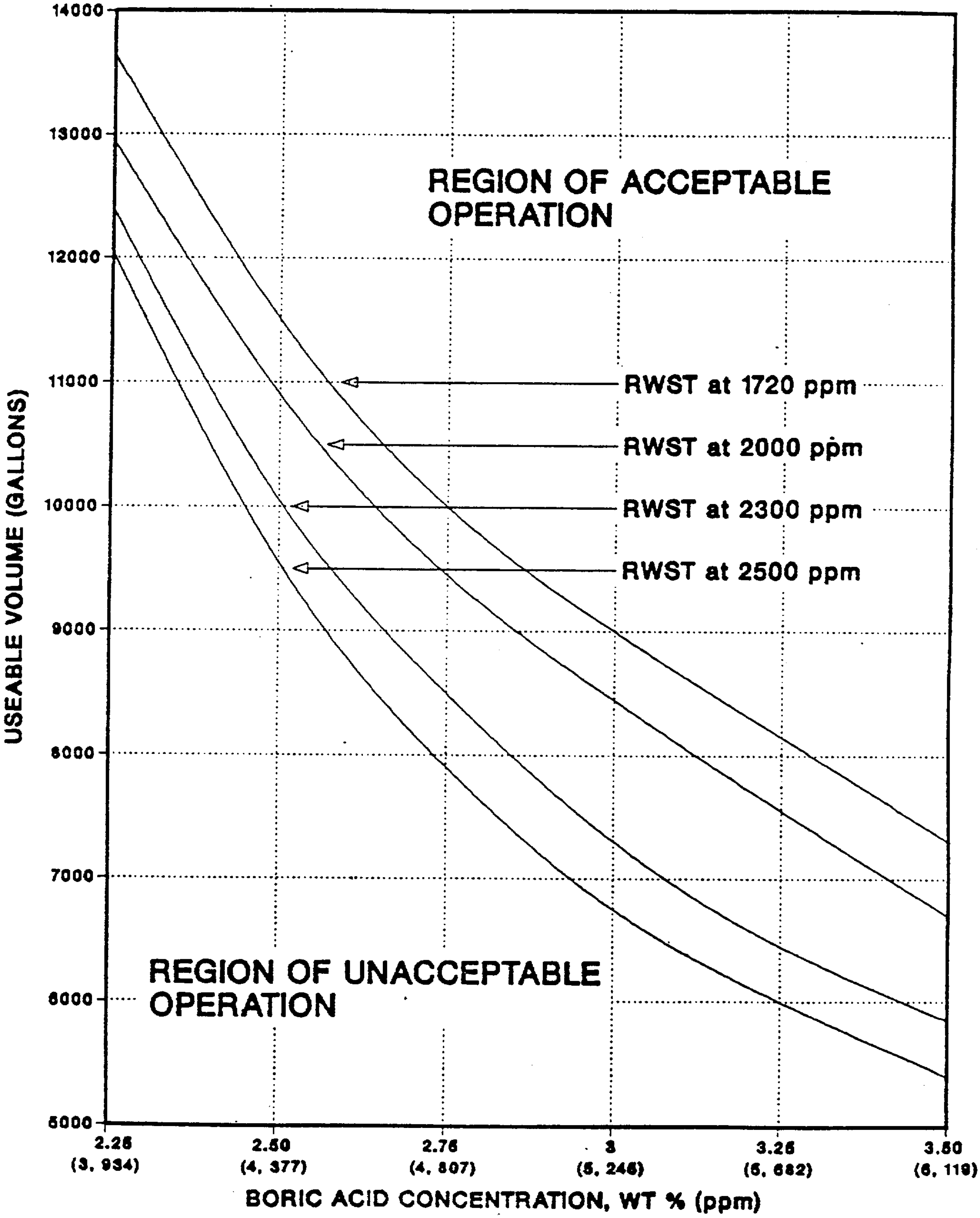
   1. Verifying the boron concentration of the water, and

   2. Verifying the contained borated water volume of the tank.

b. At least once per 24 hours by verifying the RWST temperature when it is the source of borated water when the outside air temperature is less than 40°F or greater than 100°F.

Figure 3.1-1

REQUIRED STORED BORIC ACID VOLUME AS A FUNCTION OF CONCENTRATION



BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 The following borated water sources shall be OPERABLE:

a. At least one of the following combinations:

1) One boric acid makeup tank, with the tank contents in accordance with Figure 3.1-1, its associated gravity feed valve, and boric acid makeup pump,

2) Two boric acid makeup tanks, with the combined contents of the tanks in accordance with Figure 3.1-1, their associated gravity feed valves, and boric acid makeup pumps,

3) Two boric acid makeup tanks, each with contents in accordance with Figure 3.1-1, at least one gravity feed valve, and at least one boric acid makeup pump and,

b. The refueling water storage tank with:

1. A minimum contained borated water volume of 362,800 gallons above the ECCS suction connection,

2. Between 1720 and 2500 ppm of boron, and

3. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the above required boric acid makeup tank(s) inoperable, restore the tank(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 3.0% delta k/k at 200°F; restore the above required boric acid makeup tank(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the refueling water tank inoperable, restore the tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each borated water sources shall be demonstrated OPERABLE:

a. At least once per 7 days by:

BORATED WATER SOURCES - OPERATING

SURVEILLANCE REQUIREMENTS (Continued)

1. Verifying the boron concentration in the water, and

2. Verifying the contained borated water volume of the water source.

b. At least once per 24 hours by verifying the RWST temperature when the outside air temperature is less than 40°F or greater than 100°F.

3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 SAFETY INJECTION TANKS

LIMITING CONDITION FOR OPERATION

3.5.1 Each reactor coolant system safety injection tank shall be OPERABLE with:

a. The isolation valve open and power to the valve removed,

b. A contained borated water volume of between 1680 and 1807 cubic feet,

c. Between 1720 and 2500 ppm of boron, and

d. A nitrogen cover-pressure of between 600 and 625 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

a. With one safety injection tank inoperable, except as a result of a closed isolation valve, restore the inoperable tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With one safety injection tank inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in at least HOT STANDBY within one hour and be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1 Each safety injection tank shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1. Verifying that the contained borated water volume and nitrogen cover-pressure in the tanks is within the above limits, and

2. Verifying that each safety injection tank isolation valve is open.

*With pressurizer pressure greater than or equal to 715 psia.

SURVEILLANCE REQUIREMENTS (Continued)

b. At least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to 1% of tank volume by verifying the boron concentration of the safety injection tank solution.

c. At least once per 31 days by verifying the fuses removed from each safety injection tank vent valve.

d. At least once per 31 days when the RCS pressure is above 715 psia, by verifying that the isolation valve operator breakers are padlocked in the open position.

e. At least once per 18 months by verifying that each safety injection tank isolation valve opens automatically under each of the following conditions:

    1. Before an actual or simulated RCS pressure signal exceeds 715 psia, and

    2. Upon receipt of an SIAS test signal.

3/4.5.3 ECCS SUBSYSTEMS - T_{avg} LESS THAN 350°F

LIMITING CONDITION FOR OPERATION

3.5.3 As a minimum, one ECCS subsystem comprised of the following shall be OPERABLE:

a. One OPERABLE high-pressure safety injection pump, and

b. An OPERABLE flow path capable of taking suction from the refueling water tank on a Safety Injection Actuation Signal and automatically transferring suction to the containment sump on a Recirculation Actuation Signal.

APPLICABILITY: MODES 3* and 4.

ACTION:

a. With no ECCS subsystem OPERABLE, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.

b. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

SURVEILLANCE REQUIREMENTS

4.5.3 The ECCS subsystem shall be demonstrated OPERABLE per the applicable Surveillance Requirements of 4.5.2.

*With pressurizer pressure less than 400 psia.

3/4.5.4 REFUELING WATER STORAGE TANK

LIMITING CONDITION FOR OPERATION

3.5.4 The refueling water storage tank shall be OPERABLE with:

a. A minimum borated water volume of 362,800 gallons above the ECCS suction connection,

b. Between 1720 and 2500 ppm of boron, and

c. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the refueling water storage tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 The RWST shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the contained borated water volume in the tank, and

2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the RWST temperature when the outside air temperature is less than 40°F or greater than 100°F.

3/4.1 REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 5.15% delta k/k is required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR safety analysis assumptions. With T_{avg} less than or equal to 200°F, the reactivity transients resulting from any postulated accident are minimal and a 3.0% delta k/k shutdown margin provides adequate protection.

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT

The limitations on moderator temperature coefficient (MTC) are provided to ensure that the assumptions used in the accident and transient analysis remain valid through each fuel cycle. The surveillance requirements for measurement of the MTC during each fuel cycle are adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup. The confirmation that the measured MTC value is within its limit provides assurances that the coefficient will be maintained within acceptable values throughout each fuel cycle.

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 520°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, 3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and 4) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid makeup pumps, and 5) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 3.0% delta k/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires boric acid solution from the boric acid makeup tanks in the allowable concentrations and volumes of Specification 3.1.2.8 plus approximately 13,000 gallons of 1720 ppm borated water from the refueling water tank or approximately 45,000 gallons of 1720 ppm borated water from the refueling water tank alone. However, for the purpose of consistency the minimum required volume of 362,800 gallons above ECCS suction connection in Specification 3.1.2.8 is identical to the more restrictive value of Specification 3.5.4.

With the RCS temperature below 200°F one injection system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 3% delta k/k SHUTDOWN MARGIN after xenon decay and cooldown from 200°F to 140°F. This condition requires 5150 gallons of 1720 ppm borated water from either the refueling water tank or boric acid solution from a boric acid makeup tank.

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. 32
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 the Southern California Edison Company on behalf of itself and San Diego Gas and Electric Company, The City of Riverside and the City of Anaheim, California (licensees) dated October 9, 1985, complies 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 application, 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. 32, are hereby incorporated in the license. SCE shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This amendment is effective on initial entry into the applicable MODE of Cycle 3 with the following exception: Page 3/4 5-1 is effective immediately and is to be fully implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

George W. Knighton

George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing-B

Attachment:
Changes to the Technical
  Specifications

Date of Issuance: March 27, 1986

ATTACHMENT TO LICENSE AMENDMENT NO. 32

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 is the following overleaf page to the amended page.

Amendment Page	Overleaf Page
3/4 1-6	3/4 1-5
3/4 1-7	3/4 1-8
3/4 1-11	-
3/4 1-12	-
3/4 1-13	-
3/4 1-14	-
3/4 1-14a	-
3/4 1-15	-
3/4 1-16	-
3/4 5-1	3/4 5-2
3/4 5-8	3/4 5-7
B 3/4 1-2	B 3/4 1-1

MINIMUM TEMPERATURE FOR CRITICALITY

LIMITING CONDITION FOR OPERATION

3.1.1.4 The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be greater than or equal to 520°F.

APPLICABILITY: MODES 1 and 2#.

ACTION:

With a Reactor Coolant System operating loop temperature (T_{avg}) less than 520°F, restore T_{avg} to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.1.4 The Reactor Coolant System temperature (T_{avg}) shall be determined to be greater than or equal to 520°F:

a. Within 15 minutes prior to achieving reactor criticality, and

b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System T_{avg} is less than 535°F.

#With K_{eff} greater than or equal to 1.0.

3/4.1.2 BORATION SYSTEMS

FLOW PATH - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

a. A flow path from either boric acid makeup tank via either one of the boric acid makeup pumps, the blending tee or the gravity feed connection and any charging pump to the Reactor Coolant System if the boric acid makeup tank in Specification 3.1.2.7.a is OPERABLE, or

b. The flow path from the refueling water tank via either a charging pump or a high pressure safety injection pump to the Reactor Coolant System if the refueling water storage tank in Specification 3.1.2.7.b is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.1 At least one of the above required flow paths shall be demonstrated OPERABLE:

a. Intentionally deleted

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

FLOW PATHS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 The following boron injection flowpaths to the RCS via the charging pump(s) shall be OPERABLE:

a. At least one of the following combinations:

1) One boric acid makeup tank, with the tank contents in accordance with Figure 3.1-1, its associated gravity feed valve, and boric acid makeup pump.

2) Two boric acid makeup tanks, with the combined contents of the tanks in accordance with Figure 3.1-1, their associated gravity feed valves, and boric acid makeup pumps,

3) Two boric acid makeup tanks, each with contents in accordance with Figure 3.1-1, at least one gravity feed valve, and at least one boric acid makeup pump, and

b. The flow path from the refueling water storage tank.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With fewer than the above required boron injection flow paths to the Reactor Coolant System OPERABLE, restore the required boron injection flow paths to the Reactor Coolant System to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 3.0% delta k/k at 200°F within the next 6 hours; restore the required flow paths to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.2 The above required flow paths shall be demonstrated OPERABLE:

a. Intentionally deleted.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

c. At least once per 18 months during shutdown by verifying that each automatic valve in the flow path actuates to its correct position on a SIAS test signal.

CHARGING PUMP - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump or one high pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.3 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORIC ACID MAKEUP PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 The boric acid makeup pump(s) in the boron injection flow path(s) required OPERABLE pursuant to Specification 3.1.2.2a shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the boric acid makeup pump(s) required for the boron injection flow path(s) pursuant to Specification 3.1.2.2a inoperable, restore the boric acid makeup pump(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 3.0% delta k/k at 200°F; restore the above required boric acid makeup pump(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORATED WATER SOURCE - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.7 As a minimum, one of the following borated water sources shall be OPERABLE:

a. One boric acid makeup tank with a minimum boron concentration of 1720 ppm and a minimum borated water volume of 5150 gallons, or

b. The refueling water storage tanks with:

   1. A minimum borated water volume of 5150 gallons above the ECCS suction connection,

   2. A minimum boron concentration of 1720 ppm, and

   3. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.7 The above required borated water source shall be demonstrated OPERABLE:

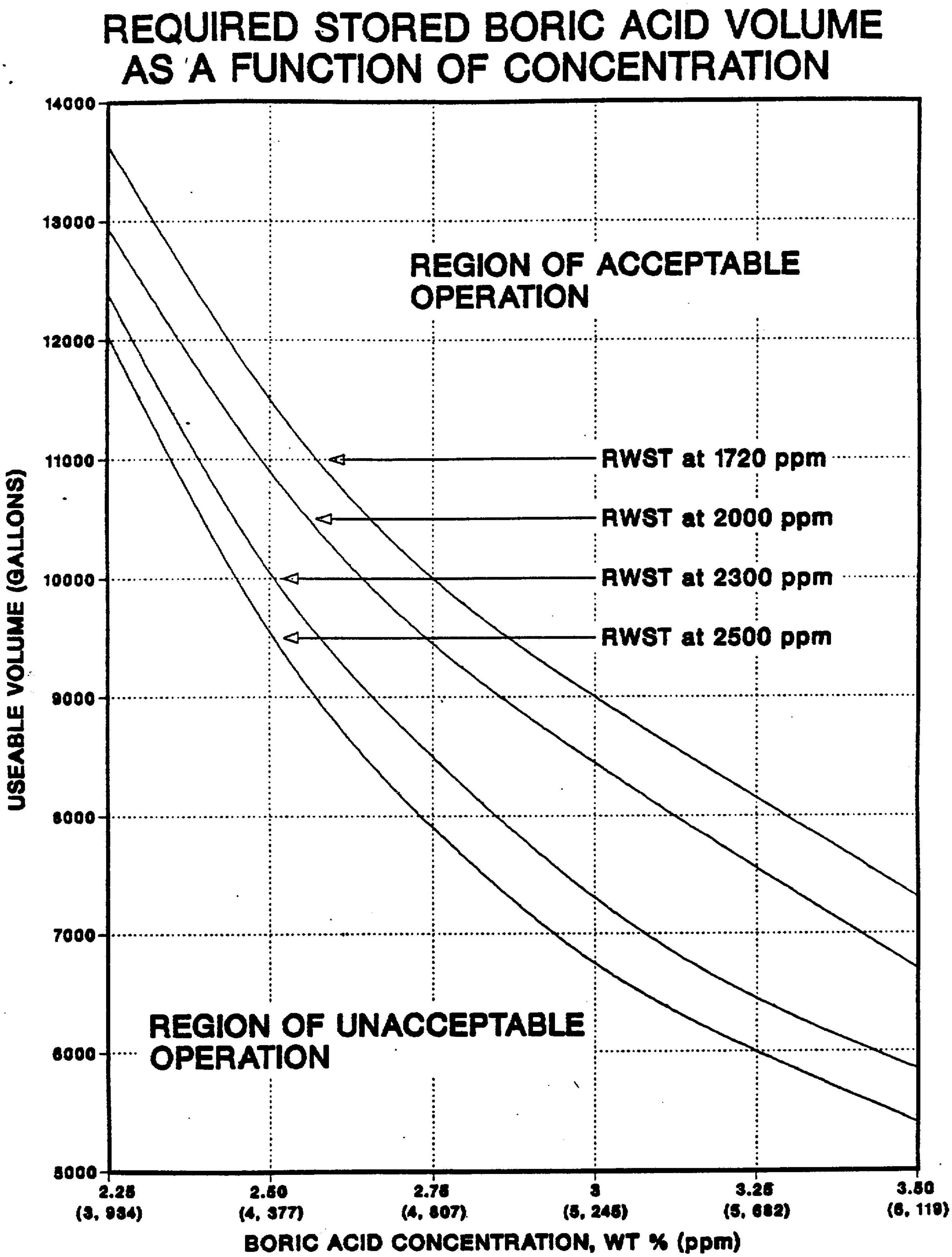
a. At least once per 7 days by:

   1. Verifying the boron concentration of the water, and

   2. Verifying the contained borated water volume of the tank.

b. At least once per 24 hours by verifying the RWST temperature when it is the source of borated water when the outside air temperature is less than 40°F or greater than 100°F.

Figure 3.1-1


REQUIRED STORED BORIC ACID VOLUME
AS A FUNCTION OF CONCENTRATION
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
USEABLE VOLUME (GALLONS)
REGION OF ACCEPTABLE OPERATION
RWST at 1720 ppm
RWST at 2000 ppm
RWST at 2300 ppm
RWST at 2500 ppm
REGION OF UNACCEPTABLE OPERATION
2.25 (3,934)
2.50 (4,377)
2.75 (4,807)
3 (5,245)
3.25 (5,682)
3.50 (6,119)
BORIC ACID CONCENTRATION, WT % (ppm)

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 The following borated water sources shall be OPERABLE:

a. At least one of the following combinations:

1) One boric acid makeup tank, with the tank contents in accordance with Figure 3.1-1, its associated gravity feed valve, and boric acid makeup pump,

2) Two boric acid makeup tanks, with the combined contents of the tanks in accordance with Figure 3.1-1, their associated gravity feed valves, and boric acid makeup pumps,

3) Two boric acid makeup tanks, each with contents in accordance with Figure 3.1-1, at least one gravity feed valve, and at least one boric acid makeup pump and,

b. The refueling water storage tank with:

1. A minimum contained borated water volume of 362,800 gallons above the ECCS suction connection,

2. Between 1720 and 2500 ppm of boron, and

3. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the above required boric acid makeup tank inoperable, restore the tank to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 3.0% delta k/k at 200°F; restore the above required boric acid makeup tank to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the refueling water tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the boron concentration in the water,

2. Verifying the contained borated water volume of the water source,

BORATED WATER SOURCES - OPERATING

SURVEILLANCE REQUIREMENTS (continued)

b. At least once per 24 hours by verifying the RWST temperature when the outside air temperature is less than 40°F or greater than 100°F.

3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 SAFETY INJECTION TANKS

LIMITING CONDITION FOR OPERATION

3.5.1 Each reactor coolant system safety injection tank shall be OPERABLE with:

a. The isolation valve open and power to the valve removed,

b. A contained borated water volume of between 1680 and 1807 cubic feet,

c. Between 1720 (1420 for Cycle 2) and 2500 ppm of boron, and

d. A nitrogen cover-pressure of between 600 and 625 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

a. With one safety injection tank inoperable, except as a result of a closed isolation valve, restore the inoperable tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With one safety injection tank inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in at least HOT STANDBY within one hour and be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1 Each safety injection tank shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1. Verifying that the contained borated water volume and nitrogen cover-pressure in the tanks is within the above limits, and

2. Verifying that each safety injection tank isolation valve is open.

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*With pressurizer pressure greater than or equal to 715 psia.

SURVEILLANCE REQUIREMENTS (Continued)

b. At least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to 1% of tank volume by verifying the boron concentration of the safety injection tank solution.

c. At least once per 31 days by verifying the fuses removed from each safety injection tank vent valve.

d. At least once per 31 days when the RCS pressure is above 715 psia, by verifying that the isolation valve operator breakers are padlocked in the open position.

e. At least once per 18 months by verifying that each safety injection tank isolation valve opens automatically under each of the following conditions:

   1. Before an actual or simulated RCS pressure signal exceeds 715 psia, and

   2. Upon receipt of an SIAS test signal.

3/4.5.3 ECCS SUBSYSTEMS - T_{avg} LESS THAN 350°F

LIMITING CONDITION FOR OPERATION

3.5.3 As a minimum, one ECCS subsystem comprised of the following shall be OPERABLE:

a. One OPERABLE high-pressure safety injection pump, and

b. An OPERABLE flow path capable of taking suction from the refueling water tank on a Safety Injection Actuation Signal and automatically transferring suction to the containment sump on a Recirculation Actuation Signal.

APPLICABILITY: MODES 3* and 4.

ACTION:

a. With no ECCS subsystem OPERABLE, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.

b. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

SURVEILLANCE REQUIREMENTS

4.5.3 The ECCS subsystem shall be demonstrated OPERABLE per the applicable Surveillance Requirements of 4.5.2.

*With pressurizer pressure less than 400 psia.

3/4.5.4 REFUELING WATER STORAGE TANK

LIMITING CONDITION FOR OPERATION

3.5.4 The refueling water storage tank shall be OPERABLE with:

a. A minimum borated water volume of 362,800 gallons above the ECCS suction connection,

b. Between 1720 and 2500 ppm of boron, and

c. A solution temperature between 40°F and 100°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the refueling water storage tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 The RWST shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the contained borated water volume in the tank, and
2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the RWST temperature when the outside air temperature is less than 40°F or greater than 100°F.

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 5.15% delta k/k is required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR safety analysis assumptions. With T_{avg} less than or equal to 200°F, the reactivity transients resulting from any postulated accident are minimal and a 3.0% delta k/k shutdown margin provides adequate protection.

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT

The limitations on moderator temperature coefficient (MTC) are provided to ensure that the assumptions used in the accident and transient analysis remain valid through each fuel cycle. The surveillance requirements for measurement of the MTC during each fuel cycle are adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup. The confirmation that the measured MTC value is within its limit provides assurances that the coefficient will be maintained within acceptable values throughout each fuel cycle.

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 520°F. This limitation is required to ensure (1) the moderator temperature coefficient is within its analyzed temperature range, (2) the protective instrumentation is within its normal operating range, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (4) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include (1) borated water sources, (2) charging pumps, (3) separate flow paths, (4) boric acid makeup pumps, and (5) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 3.0% delta k/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires boric acid solution from the boric acid makeup tanks in the allowable concentrations and volumes of Specification 3.1.2.8 plus approximately 13,000 gallons of 1720 ppm borated water from the refueling water tank or approximately 45,000 gallons of 1720 ppm borated water from the refueling water tank alone. However, for the purpose of consistency the minimum required volume of 362,800 gallons above ECCS suction connection in Specification 3.1.2.8 is identical to more restrictive value of Specification 3.5.4.

With the RCS temperature below 200°F one injection system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 3.0% delta k/k SHUTDOWN MARGIN after xenon decay and cooldown from 200°F to 140°F. This condition requires 5150 gallons of 1720 ppm borated water from either the refueling water tank or boric acid solution from the boric acid makeup tank.

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

SAFETY EVALUATION

AMENDMENT NO. 43 TO NPF-10

AMENDMENT NO. 32 TO NPF-15

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 & 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

Southern California Edison Company (SCE), on behalf of itself and the other licensees, San Diego Gas and Electric Company, The City of Riverside, California, and The City of Anaheim, California, has submitted several applications for license amendments for San Onofre Nuclear Generating Station, Units 2 and 3. One such request, Proposed Change PCN-200, is evaluated herein. This change was submitted by letter dated October 9, 1985 and would revise the technical specifications relating to boric acid concentration and flow paths. Specifically, PCN-200 will make the following changes, which are appliable to Cycle 3 of both Units 2 and 3:

(1) reduce the boric acid concentration and volume requirements for the boric acid makeup (BAMU) tanks;

(2) remove the requirement for heat tracing associated with the BAMU tanks;

(3) remove the surveillance requirement for verification of a minimum charging flow rate from the BAMU tank flow paths.

(4) increase the upper limit on boron concentration from 2300 to 2500 ppm for the refueling water storage tanks and safety injection tanks.

Also, the licensee submitted a change applicable only to Unit 3, Cycle 2, which would reduce the lower limit on safety injection tank (SIT) boron concentration from 1720 to 1420 ppm.

The NRC staff has reviewed the proposed changes to the technical specifications and the related supporting documents, and has prepared the following evaluation of proposed change PCN-200.

2.0 EVALUATION OF CALCULATIONAL METHOD

The function of the boric acid makeup (BAMU) system is to provide an adequate volume of borated water to be injected into the reactor coolant system (RCS) to assure safe plant cold shutdown from normal operation or anticipated operational occurrences. The system also provides an emergency core cooling function by injecting the borated water into the RCS via the charging pumps to assure adequate core cooling during accident conditions. The existing technical specification requirements on boric acid concentration and water volume in the BAMU tanks were based upon an analysis which showed that the plant can achieve a cooldown to cold shutdown without letdown flow. The required boration was achieved by injecting borated water into the RCS while simultaneously filling the pressurizer. To maintain the required shutdown margin specified in the technical specifications, the boron concentration typically would increase to 800 ppm prior to initiating cooldown. Since the available space in the pressurizer is limited, it is necessary to maintain a high concentration of boron solution in the BAMU tanks. With the boron concentration allowed by the existing technical specifications, heat tracing is required to prevent boron from precipitating at low temperatures. The surveillance requirement associated with this requires a minimum charging flow of 40 gpm to be available from the BAMU tanks in order to detect and avoid flow blockage due to boron precipitation.

In order to increase operating flexibility, the proposed change would reduce the boric acid concentration in the BAMU tanks. The boron concentration is reduced to a low level so that precipitation will not occur at ambient temperatures. The proposed change would also eliminate heat tracing and surveillance requirements for minimum charging flow. The proposed changes are based on a cooldown method which allows boration of the RCS without letdown flow concurrently with plant cooldown. While the pressurizer water level is maintained unchanged, the boration will be achieved by using the charging pumps to inject borated water into the RCS concurrently with cooldown as part of normal inventory makeup to compensate for coolant contraction.

To support the proposed change to the technical specifications, the licensee submitted, at the staff's request, a report (Reference 2) for review and approval. The method documented in Reference 2 consists of two distinct series of calculations of the required and available boron concentration in the RCS to maintain a safe shutdown margin. Both are applied throughout plant cooldown.

2.1 Evaluation of Analysis for Required Boron Concentration

The analysis is based on the shutdown requirements of Branch Technical Position RSB 5.1 (SRP Section 5.4.7). Specifically, the shutdown margin requirements are consistent with that specified in Technical Specifications 3.1.1.1 and 3.1.1.2 for Operating Modes 1 through 4, and 5 through 6, respectively. The ROCS and DIT computer codes (Reference 4) were used to calculate the boron concentration required in the RCS for the shutdown margins required by the technical specifications. In the analysis, the analytical and measurement uncertainties were included to ensure that the upper bounding boron requirements were determined. The uncertainties include ±9% in scram worth, ±10% in moderator temperature feedback, ±15% in Doppler reactivity feedback, ±50 ppm in boron measurement uncertainty, and time constant of 26 hours for xenon decay to maximize the xenon poison effect.

We have reviewed the analysis for required boron concentration and found the analysis acceptable since (1) the NRC approved codes ROCS and DIT (Reference 4) were used for the analysis, (2) the appropriate uncertainties for the important core parameters were included to obtain the maximum required boron concentration and (3) the required boron concentrations provide shutdown margins that are consistent with the technical specification values.

2.2 Evaluation of Analysis for Available Boron Concentration

The calculational method is based on a steady state mass balance for boron in the entire RCS. It is assumed that the borated water added to the RCS is equal to the fluid volume contraction due to the cooldown while the pressurizer water level is maintained constant. To simplify the analysis, instantaneous and complete mixing of the RCS fluid and makeup fluid added to the RCS through the loop charging nozzle was assumed. In response to our questions regarding the mixing model used in the analysis, the licensee performed an additional analysis (References 2, 5) to assess the effect of boron mixing delay on the available boron concentration. The analysis assumed a slug fluid model with delay time of 30 minutes for the boron added and the results, with inclusion of the uncertainties for the core conditions, showed that the proposed boron concentration and volume of the BAMU tanks are sufficient to provide borated water to the RCS to meet the required shutdown margin as discussed in Section 2.1, above.

In the analysis, various core conditions were considered by the licensee to maximize the boron concentration requirements. The limiting core conditions identified and used in the analyses were: (1) end-of-cycle conditions with initial RCS concentrations at zero ppm boron, (2) the core with the most reactive control rod stuck fully out, (3) plant power at 100% with 100% equilibrium xenon prior to initiation of plant shutdown and (4) a relatively slow plant cooldown rate of 12.5°F/hr.

We have reviewed the analysis, including the delay effect and find the analysis acceptable since (1) the use of a delay time of 30 minutes is consistent with the results of tests which were performed in the same plant during natural circulation conditions (Reference 3), and (2) a slug fluid model of boron transport is conservative to maximize the delay effect. We have also reviewed the above core conditions used in the analysis and we agree with the licensee that use of these conditions is conservative with respect to maximizing the boron requirements since items (1) and (2) above minimize the existing boron worth in the core, and items (3) and (4) above maximize the xenon poison effect. In addition, the use of a cooldown rate of 12.5°F/hr is consistent with the plant test procedures used during the boron mixing test under natural circulation conditions for SONGS as described in Reference 3. In response to a request by the staff, the licensee also submitted an analytical result boron concentration requirement for the case with the maximum cooldown rate allowed by the technical specifications (75°F/hr) is bounded by the case with the slow cooldown rate of 12.5°F/hr. We, therefore, conclude that the assumptions used for the analysis are conservative in that they maximize the boron concentration requirements and are therefore acceptable.

In summary, we find that an approved method was used to calculate the required boron concentration, and that the results are consistent with the shutdown margins required by the technical specifications. We also find that conservative core conditions were used and that the analytical results with inclusion of fluid mixing delay demonstrate that the proposed boron concentration and volume of the BAMU tanks is adequate to maintain safe shutdown margin consistent with the technical specification requirements. Therefore, we conclude that the calculational method and the analytical results included in Reference 2 are acceptable for use as a basis for justification of the proposed technical specification changes for SONGS Units 2 and 3.

2.3 Transient and Accident Evaluation

The licensee performed an evaluation to assess the impact on transient and accident behavior of the proposed reduction in boron concentration of the SIT and BAMU tanks.

The licensee has stated that the borated water injected from the BAMU tank was not taken into account in the steamline break accident (SLB) analyses but the boron concentration in BAMU tanks of 1720 ppm was included in the loss-of-coolant-accident (LOCA) analysis. Also, the licensee stated that since the revised boron concentration in the BAMU tanks is higher than 1720 ppm, the licensee concluded that the reduction in boron concentration for the BAMU tanks would not effect the analytical results in the FSAR for the SLB and LOCA accidents.

The licensee has also evaluated the impact of the reduced boron concentration in the SIT on the results of the steam line break and LOCA analyses. For the SLB events, two limiting events were identified: (1) hot full power with a loss of AC power and (2) zero power with a loss of AC power. For both cases, the licensee stated that the return-to-power peaks without or before initiation of the SIT. In addition, the licensee reviewed the non-limiting cases (SLBs with AC power available) and confirmed that the SIT was not required to prevent return-to-power.

For the LOCA analysis, the licensee indicated that the analytical results showed that the SIT boron solution with a lower limit of 1420 ppm is sufficient to provide an adequate shutdown margin (1%) for the Unit 3 Cycle 2 core during LOCA conditions.

We have reviewed the licensee's submittal and find that the proposed technical specifcation changes regarding reduced boron concentration in the SIT and BAMU tanks are acceptable, because they will not result in a significant reduction in safety margin.

By letter dated March 4, 1986, (Reference 6) the licensee committed to provide confirmatory analyses to support the conclusions presented to the staff regarding the effect of reduced boron concentration in the SIT on the transient analysis.

Based on this commitment, and our review of the information provided to date, we conclude that the transient and accident analyses are acceptable.

3.0 EVALUATION OF TECHNICAL SPECIFICATION CHANGES

The specific technical specification changes proposed in PCN-200 and the reasons for their acceptability are as follows:

Technical Specification 3/4.1.2.1

The proposed changes to this technical specification would eliminate the heat tracing of the boric acid makeup (BAMU) system and the associated surveillance requirements related to a minimum charging flow rate.

The purpose of heat tracing of the BAMU system is to maintain the temperature of the fluid in the BAMU tanks high enough to prevent the boric acid from precipitating. The proposed changes to T.S. 3/4.1.2.8 would reduce the allowed concentration in the BAMU tanks to a maximum of 3.5 weight percent boric acid, which will not precipitate at fluid temperature higher than 50°F. Table 9.4.4 of the FSAR indicates that the design temperature range for the BAMU tanks is 50-104°F which is sufficiently high to prevent boron from precipitating in the BAMU system. With respect to removing the surveillance requirement on the boration path, the main purpose of this requirement is to ensure that precipitation has not caused flow blockage. The proposed change in boron concentration will preclude precipitation. Also, there are other technical specifications associated with the inservice inspection (ISI) program that will verify the operability of the pumps and valves in this system. The proposed changes are, therefore, acceptable.

Technical Specification 3/4.1.2.2

Currently, this technical specification requires two out of the following three flow paths for boron injection into the RCS: (1) a BAMU tank gravity feed path and associated heat tracing, (2) a BAMU tank path via a boric acid makeup pump and associated heat tracing, or (3) the gravity feed path from the refueling water tank via a charging pump.

The technical specifications also require heat tracing to be operable and verification at least once per 18 months to ensure that the flow path from the BAMU tanks are capable of delivering a flow of at least 40 gpm to the RCS.

The proposed change would add a new item, in addition to the current requirements, which requires both existing flow paths (through the gravity feed valve and BAMU pumps) from any credited BAMU tanks to be operable. The existing technical specifications require only one flow path to be operable. The change constitutes an additional restriction, and is therefore acceptable. Also the changes to remove the surveillance requirements related to the heat tracing and the associated flow rate verification are acceptable for the reasons stated above.

Technical Specification 3.1.2.6

This technical specification requires that operable BAMU pumps be capable of being powered from an operable emergency power source. Since the same requirement is specified in Technical Specification 3/4.8.1.1, Electrical Power System (AC Sources), the proposed change to delete this requirement is editorial and is therefore acceptable.

Technical Specification 3/4.1.2.7 (for Operating Modes 5 and 6)

The existing technical specification requires that either (1) one BAMU tank and the associated heat tracing be operable with the tank's content in accordance with Figure 3.1-1, or (2) the Refueling Water Storage Tank (RWST) be operable and a minimum borated water volume of 9970 gallons with a minimum boron concentration of 1720 ppm. The technical specification also requires verification of the BAMU tank solution temperature. The proposed change would require a minimum boron content in accordance with revised Figure 3.1-1 for a BAMU tank, or a minimum required volume of 5150 gallons to be maintained in a RWST with a minimum boron concentration of 1720 ppm. The changes are consistent with the analytical results discussed in Section 2.2, above (the analysis is applicable to the cooldown by using either the BAMU or RWST tanks for Modes 5 and 6.) and therefore are acceptable. The deletion of the temperature requirement for the BAMU tank solution is acceptable since the boric acid content in BAMU tanks has been reduced to 3.5 weight percent which will not precipitate at the ambient temperature around the BAMU tanks.

Figure 3.1-1 (for Operating Modes 1 to 4)

This figure specifies the minimum required BAMU water volume and temperature as a function of stored boric acid concentration for the various plant operating modes. The revised figure specifies the minimum required water volume (contained in one or both BAMU tanks) as a function of boric acid concentration for a given boron concentration in the RWST. The range of boron concentration in the BAMU tank has been reduced from 8.5-12 weight percent boric acid to 2.25-3.5 weight percent.

The proposed changes are consistent with the analytical results (as discussed above for plant conditions in Operating Modes 1 to 4, will maintain the required safe shutdown margin, and are therefore acceptable.

Technical Specification 3.1.2.8 (Operating Modes 1 to 4)

This technical specification requires that at least one BAMU tank and its associated heat tracing be operable with the contents of boric acid in the tank to be in accordance with Figure 3.1-1. Figure 3.1-1 requires a minimum volume of boric acid of 5450 gallons at a concentration of 8.5 weight percent to be maintained in the BAMU tank. The technical specification also requires that the RWST be operable, containing a minimum of 362,000 gallons borated water with the boric acid concentration between 1720 and 2300 ppm.

The proposed changes would reduce the range of the boric acid concentration as specified in the revised Figure 3.1.1. Also, the concentration of the borated water in the RWST would be changed to range between 1720 and 2500 ppm while the boric acid volume is maintained unchanged. The surveillance requirement to verify the BAMU tank solution temperature would be deleted.

We conclude that the revised Figure 3.1.1 is acceptable since the analytical results discussed in Section 2 above support the changes. The change of upper limit from 2300 to 2500 ppm for boron concentration in the RWST is acceptable since boric acid at a concentration of 2500 ppm will not precipitate at temperatures higher than 32°F. Based on this we conclude that the change will not result in boron precipitation in the RWST nor in the Reactor Coolant System after a LOCA. The deletion of the surveillance requirement on the BAMU solution temperature is acceptable since the concentration of the BAMU solution is low and precipitation will be avoided at ambient temperature.

Technical Specifications 3.5.1 and 3.5.4

These changes would increase the upper limit on boron concentration for the RWST and the SIT from 2300 ppm to 2500 ppm. These changes are acceptable because boric acid at a concentration of 2500 ppm will not precipitate at temperatures higher than 32°F and thus will not precipitate in the core following a LOCA.

The change would also reduce the lower limit on boric acid concentration in the SIT from 1720 ppm to 1420 ppm for the Unit 3 Cycle 2 core. The change is consistent with the evaluation results discussed in Section 2.3, above and is acceptable.

Technical Specification 3/4.1.2 Bases

This technical specification defines (1) the required components for the boron injection system which ensures that negative reactivity is available during each mode of operation and (2) the boric acid concentration and volume requirements for the BAMU tanks.

The proposed change would delete the requirement for heat tracing of the BAMU tank and reduce the boric acid concentration and volume requirement in accordance with the proposed Figure 3.1-1.

We have reviewed the proposed changes and find (1) that they are consistent with the assumptions used for the analysis and (2) that the analytical results discussed in Section 2, above demonstrate that the required shutdown margin is available. On this basis we conclude that the changes are acceptable.

4.0 SUMMARY OF STAFF EVALUATION

We have reviewed the proposed changes (PCN-200) to the SONGS 2 and 3 technical specifications. The changes involve a reduction in boric acid concentration and volume requirements for the BAMU tanks, deletion of the requirements for heat tracing in the BAMU system and verification of a minimum flow rate from the BAMU flow paths. We have also reviewed the associated request to reduce the minimum required boron concentration from 1720 ppm to 1420 ppm for the SIT for the Unit 3 Cycle 2 core. As is discussed above in detail, we find that the proposed changes are acceptable because they meet the applicable General Design Criteria and the applicable sections of the Standard Review Plan.

5.0 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 determinations of no significant hazards consideration. No comments were received.

6.0 ENVIRONMENTAL CONSIDERATION

These amendments involve changes in the installation or use of facility components located within the restricted area. The staff has determined that the amendments involve no significant increase in the amounts of any effluents that may be released offsite and that there is no significant increase in individual or cummulative occupation radiation exposure. The Commission has previously issued proposed findings that the amendments involve no significant hazards consideration, and there has been no public comment on such findings. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR Sec. 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need to be prepared in connection with the issuance of these amendments.

7.0 CONCLUSION

Based upon our evaluation of the proposed changes to the San Onofre Units 2 and 3 Technical Specifications, we have concluded that: there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and such activities will be conducted in compliance with the Commission's regulations and the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public. We, therefore, conclude that the proposed changes are acceptable, and are hereby incorporated into the San Onofre 2 and 3 Technical Specifications.

Dated: March 27, 1986

8.0 References

1. Letter dated October 9, 1985, with attachments, from M. Medford (SCE) to G. Knighton (NRC).

2. Letter dated February 11, 1986 from M. Medford (SCE) to G. Knighton (NRC) transmitting CEN-316 (S), "Boric Acid Makeup Tank Concentration Reduction Effort, Technical Bases and Operational Analysis (January 1986)."

3. Letter dated July 2, 1984 from K. P. Baskin (SCE) to G. Knighton (NRC) enclosing CEN-259, "An Evaluation of the Natural Circulation Cooldown Test Performed at the San Onofre Nuclear Generating Station," Combustion Engineering, January 1984.

4. CENPD-266-P-A, "The ROCS and DIT Computer Codes for Nuclear Design," Combustion Engineering, April 1983.

5. Letter dated February 19, 1986 from Medford (SCE) to G. Knighton (NRC) transmitting the responses to NRC review questions on PCN-200.

6. Letter dated March 4, 1986 from Medford (SCE) to G. Knighton (NRC) trasmitting information inadvertently omitted from the February 11, 1986 letter.