November 16, 1994

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Mr. D. L. Farrar
Nuclear Licensing Manager
Commonwealth Edison Company-Suite 300
OPUS West III
1400 OPUS Place
Downers Grove, Illinois 60515

Dear Mr. Farrar:

SUBJECT: ISSUANCE OF AMENDMENTS (TAC NOS. M84922, M84923, M84924 AND M84925)

The Commission has issued the enclosed Amendment No. 130 to Facility Operating License No. DPR-19 for Dresden, Unit 2, Amendment No. 124 to Facility Operating License No. DPR-25 for Dresden, Unit 3, Amendment No. 151 to Facility Operating License No. DPR-29 for Quad Cities, Unit 1, and Amendment No. 147 to Facility Operating license No. DPR-30 for Quad Cities, Unit 2. The amendments are in response to your application dated October 15, 1992.

The proposed amendments would revise the Dresden and Quad Cities Technical Specification (TS) 3/4.4 to revise the sodium pentaborate solution concentrations for the Standby Liquid Control System (SLCS) storage tanks based on net positive suction head test results.

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

Sincerely,

Original signed by:

John F. Stang, Senior Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket Nos. 50-237, 50-249, 50-254, 50-265

Enclosures:
1. Amendment No. 130 to DPR-19
2. Amendment No. 124 to DPR-25
3. Amendment No. 151 to DPR-29
4. Amendment No. 147 to DPR-30
5. Safety Evaluation

cc w/encl: See next page

*See previous concurrence

CP-1
DF01

OFC	LA:PDIII-2	PM:PDIII-2	D:PDIII-2	OGC	BC:SRXB	PM:PDIII-2
NAME	CMOORE*	JSTANG*	RCAPRA	SCHIDAKEL*	RJONES*	RPULSIFER*
DATE	08/08/94	08/10/94	11/16/94	11/08/94	08/12/94	08/10/94
COPY	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO

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Mr. D. L. Farrar
Commonwealth Edison Company

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Unit Nos. 2 and 3

cc:

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Chicago, Illinois 60690

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Chairman
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Mr. D. L. Farrar
Commonwealth Edison Company

Quad Cities Nuclear Power Station
Unit Nos. 1 and 2

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U.S. NRC, Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

COMMONWEALTH EDISON COMPANY

DOCKET NO. 50-237

DRESDEN NUCLEAR POWER STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 130
License No. DPR-19

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

   A. The application for amendment by the Commonwealth Edison Company (the licensee) dated October 15, 1992 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

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

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-19 is hereby amended to read as follows:

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(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 130, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance, and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stang, Senior Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 16, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 130

FACILITY OPERATING LICENSE NO. DPR-19

DOCKET NO. 50-237

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
viii	viii
3/4.4-3	3/4.4-3
3/4.4-4	3/4.4-4
B3/4.4-6	B3/4.4-6
B3/4.4-7	B3/4.4-7

List of Tables (continued)

		Page
Table 3.12-1	Deleted	
Table 3.12-2	Deleted	
Table 3.12-3	Deleted	
Table 3.12-4	Deleted	
Table 6.1.1	Minimum Shift Manning Chart	6-4
Table 6.6.1	Special Reports	6-23

List of Figures

Figure 2.1-3	APRM Bias Scram Relationship to Normal Operating Conditions	B 1/2.1-17
Figure 4.1.1	Graphical Aid in the Selection of an Adequate Interval Between Tests	B 3/4.1-18
Figure 4.2.2	Test Interval vs System Unavailability	B 3/4.2-38
Figure 3.4.1	Sodium Pentaborate Solution Volume Requirements	3/4.4-4
Figure 3.4.2	Sodium Pentaborate Solution Temperature Requirements	3/4.4-5
Figure 3.6.1	Minimum Reactor Vessel Metal Temperature	3/4.6-23
Figure 3.6.2	Deleted	3/4.6-24
Figure 4.6.1	Minimum Reactor Pressurization Temperature	B 3/4.6-29
Figure 4.6.2	Chloride Stress Corrosion Test Results at 500°F	B 3/4.6-31
Figure 4.8.1	Owner Controlled/Unrestricted Area Boundary	B 3/4.8-38
Figure 4.8.2	Detail of Central Complex	B 3/4.8-39
Figure 6.1-1	Offsite Organization - Deleted	
Figure 6.1-2	Station Organization - Deleted	

3.4 LIMITING CONDITION FOR OPERATION (Cont'd.)

is made or found to be inoperable, Specification 3.4.A shall be considered fulfilled, and continued operation permitted provided that the component is returned to an operable condition within 7 days.

C. The liquid poison tank shall contain a boron bearing solution of at least 14 weight percent, but not more than 16.5 weight percent sodium pentaborate decahydrate at all times when the standby liquid control system is required to be operable. The available volume and temperature of the sodium pentaborate solution shall be greater than or equal to the limits specified by Figures 3.4.1 and 3.4.2.

D. If specifications 3.4.A through C are not met, an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

4.4 SURVEILLANCE REQUIREMENT (Cont'd.)

component shall be demonstrated to be operable immediately and daily thereafter.

C. The availability of the proper boron bearing solution shall be verified by performance of the following tests:

1. At least once per month - Boron concentration shall be determined. In addition, the boron concentration shall be determined any time water or boron are added or if the solution temperature drops below the limits specified by Figure 3.4.2. Minimum concentration is 14 wt. percent sodium pentaborate.

2. At least once per day - The solution volume and temperature shall be verified to be greater than or equal to the limits specified by Figures 3.4.1 and 3.4.2.

3. Deleted.

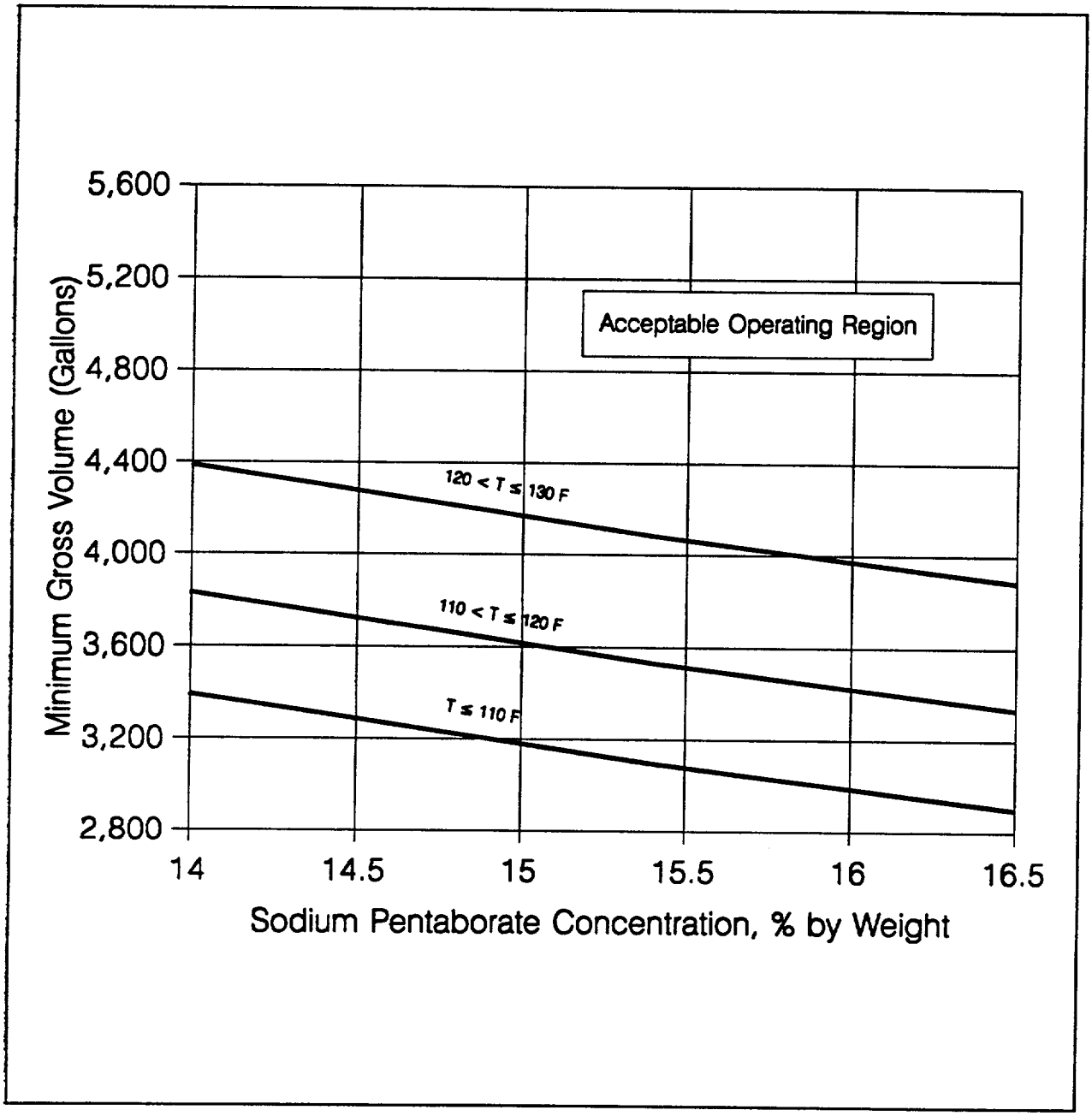

Figure 3.4.1 Sodium Pentaborate Solution Volume Requirements

3.4 LIMITING CONDITION FOR OPERATION BASES

A. The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown assuming that none of the withdrawn control rods can be inserted. To meet this objective, the liquid control system is designed to inject a quantity of boron which produces a concentration of no less than 600 ppm of boron in the reactor core in less than 100 minutes. 600 ppm boron concentration in the reactor core is required to bring the reactor from full power to a 3% delta k or more subcritical condition considering the hot to cold reactivity swing and xenon poisoning. An additional margin of 25% boron is added to compensate for possible imperfect mixing of the chemical solution in the reactor water, making the total concentration 750 ppm of boron in the reactor core. A minimum net quantity of 3035 gallons of solution having a 14 wt. percent sodium pentaborate concentration is required to meet this shutdown requirement. An additional volume of solution is contained below the pump suction and is not available for injection. Other equivalent combinations of increased concentration and reduced volume are also acceptable provided they have considered required temperatures and net positive suction head.

For a required pumping rate of 40 gpm per pump, a minimum of 3035 gallons of at least 14 wt. percent solution at $\leq$ 110°F will be inserted in less than 100 minutes. This insertion rate of boron solution will override the rate of reactivity insertion due to cool down of the reactor following the xenon peak. Two pump operation will enable faster reactor shutdown for ATWS events. The minimum gross volume required in the storage tank is dependent on solution temperature (to assure adequate net positive suction head). The monthly pump minimum flowrate test shall require a minimum flowrate of 40 gpm per pump. This requirement, combined with the solution concentration requirement of at least 14 wt. percent, will demonstrate that the Standby Liquid Control System meets the requirements of 10 CFR 50.62.

Boron concentration, solution temperature, and volume are checked on a frequency to assure a high reliability of operation of the system should it ever be required. Experience with pump operability indicates that monthly testing is adequate to detect if failures have occurred.

Components of the system are checked periodically as described above and make a functional test of the entire system on a frequency of less than once during each operating cycle unnecessary. A test of one installed explosive charge is made at least once during each operating cycle to assure that the charges have not deteriorated, the actuation circuit is functioning properly, the valve functions properly, and no flow blockages exist. The replacement charge will be selected from a batch for which there has been a successful test firing. Recommendations of the vendor shall be followed in maintaining a five-year life of the explosive charges. A continual check of the firing circuit continuity is provided by pilot lights in the control room.

3.4 LIMITING CONDITION FOR OPERATION BASES (Cont'd.)

The relief valves in the standby liquid control system protect the system piping and positive displacement pumps which are nominally designed for 1500 psig protection from over-pressure. The pressure relief valves discharge back to the standby liquid control solution tank.

B. Only one of the two standby liquid control pumping circuits is needed for proper operation of the system. If one pumping circuit is found to be inoperable, there is no immediate threat to shutdown capability, and reactor operation may continue while repairs are being made. Assurance that the remaining system will perform its intended function and that the reliability of the system is good is obtained by demonstrating operation of the pump in the operable circuit at least once daily.

C. For the maximum solution concentration of 16.5 wt. percent sodium pentaborate, the saturation temperature is 73°F. To guard against boron precipitation, the solution including that in the pump suction piping is kept at least 10°F above the saturation temperature by a tank heater and by heat tracing in the pump suction piping. The 10°F margin is included in Figure 3.4.2. Temperature and liquid level alarms for the system are annunciated in the control room. Figure 3.4.1 provides additional requirements for minimum tank volume based on solution temperature and concentration to ensure adequate net positive suction head exists for one or two pump operation.

Pump operability is checked on a frequency to assure a high reliability of operation of the system should it ever be required.

Once the solution has been made up, boron concentration will not vary unless more boron or more water is added. Level indication and alarm indicate whether the solution volume has changed which might indicate a possible solution concentration change. Considering these factors, the test interval has been established.

4.4 SURVEILLANCE REQUIREMENT BASES

Periodic tests to demonstrate two-pump flow capability are not feasible in the present system configuration and are unnecessary because the flow path integrity can be determined from the test of a single pump. Initial two-pump test data correlation with single-pump test data verified the capability of the piping to support two-pump flow. Periodic single-pump test data is compared to the required flow rate and to the previous test data to identify any significant degradation.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

COMMONWEALTH EDISON COMPANY

DOCKET NO. 50-249

DRESDEN NUCLEAR POWER STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 124
License No. DPR-25

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

   A. The application for amendment by the Commonwealth Edison Company (the licensee) dated October 15, 1992 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

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

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 3.B. of Facility Operating License No. DPR-25 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 124 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance, and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stang, Senior Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 16, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 124

FACILITY OPERATING LICENSE NO. DPR-25

DOCKET NO. 50-249

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
viii	viii
3/4.4-3	3/4.4-3
3/4.4-4	3/4.4-4
B 3/4.4-6	B 3/4.4-6
B 3/4.4-7	B 3/4.4-7

List of Tables (continued)

		Page
Table 3.12-2	Deleted	
Table 3.12-3	Deleted	
Table 3.12-4	Deleted	
Table 6.1.1	Minimum Shift Manning Chart	6-4
Table 6.6.1	Special Reports	6-22

List of Figures

Figure 2.1-3	APRM Bias Scram Relationship to Normal Operating Conditions	B 1/2.1-17
Figure 4.1.1	Graphical Aid in the Selection of an Adequate Interval Between Tests	B 3/4.1-18
Figure 4.2.2	Test Interval vs System Unavailability	B 3/4.2-38
Figure 3.4.1	Sodium Pentaborate Solution Volume Requirements	3/4.4-4
Figure 3.4.2	Sodium Pentaborate Solution Temperature Requirements	3/4.4-5
Figure 3.6.1	Minimum Reactor Vessel Metal Temperature	3/4.6-23
Figure 3.6.2	Deleted	3/4.6-24
Figure 4.6.1	Minimum Reactor Pressurization Temperature	B 3/4.6-29
Figure 4.6.2	Chloride Stress Corrosion Test Results at 500°F	B 3/4.6-31
Figure 4.8.1	Owner Controlled/Unrestricted Area Boundary	B 3/4.8-38
Figure 4.8.2	Detail of Central Complex	B 3/4.8-39
Figure 6.1-1	Offsite Organization - Deleted	
Figure 6.1-2	Station Organization - Deleted	

3.4 LIMITING CONDITION FOR OPERATION (Cont'd.)

is made or found to be inoperable, Specification 3.4.A shall be considered fulfilled, and continued operation permitted provided that the component is returned to an operable condition within 7 days.

C. The liquid poison tank shall contain a boron bearing solution of at least 14 weight percent, but not more than 16.5 weight percent sodium pentaborate decahydrate at all times when the standby liquid control system is required to be operable. The available volume and temperature of the sodium pentaborate solution shall be greater than or equal to the limits specified by Figures 3.4.1 and 3.4.2.

D. If specifications 3.4.A through C are not met, an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

4.4 SURVEILLANCE REQUIREMENT (Cont'd.)

component shall be demonstrated to be operable immediately and daily thereafter.

C. The availability of the proper boron bearing solution shall be verified by performance of the following tests:

1. At least once per month - Boron concentration shall be determined. In addition, the boron concentration shall be determined any time water or boron are added or if the solution temperature drops below the limits specified by Figure 3.4.2. Minimum concentration is 14 wt. percent sodium pentaborate.

2. At least once per day - The solution volume and temperature shall be verified to be greater than or equal to the limits specified by Figures 3.4.1 and 3.4.2.

3. Deleted.

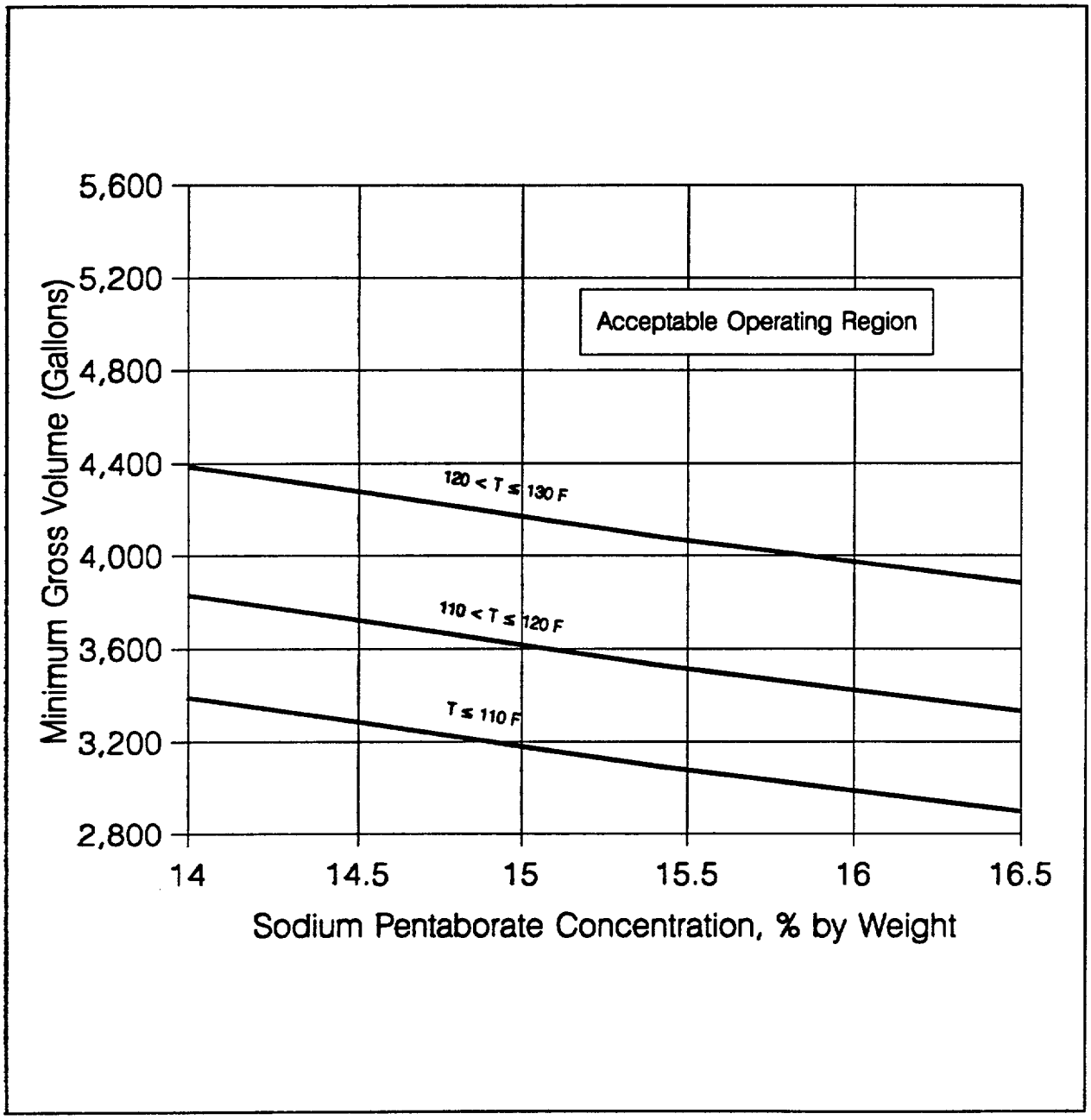

Figure 3.4.1 Sodium Pentaborate Solution Volume Requirements

3.4 LIMITING CONDITION FOR OPERATION BASES

A. The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown assuming that none of the withdrawn control rods can be inserted. To meet this objective, the liquid control system is designed to inject a quantity of boron which produces a concentration of no less than 600 ppm of boron in the reactor core in less than 100 minutes. 600 ppm boron concentration in the reactor core is required to bring the reactor from full power to a 3% delta k or more subcritical condition considering the hot to cold reactivity swing and xenon poisoning. An additional margin of 25% boron is added to compensate for possible imperfect mixing of the chemical solution in the reactor water, making the total concentration 750 ppm of boron in the reactor core. A minimum net quantity of 3035 gallons of solution having a 14 wt. percent sodium pentaborate concentration is required to meet this shutdown requirement. An additional volume of solution is contained below the pump suction and is not available for injection. Other equivalent combinations of increased concentration and reduced volume are also acceptable provided they have considered required temperatures and net positive suction head.

For a required pumping rate of 40 gpm per pump, a minimum of 3035 gallons of at least 14 wt. percent solution at $\leq$ 110°F will be inserted in less than 100 minutes. This insertion rate of boron solution will override the rate of reactivity insertion due to cool down of the reactor following the xenon peak. Two pump operation will enable faster reactor shutdown for ATWS events. The minimum gross volume required in the storage tank is dependent on solution temperature (to assure adequate net positive suction head). The monthly pump minimum flowrate test shall require a minimum flowrate of 40 gpm per pump. This requirement, combined with the solution concentration requirement of at least 14 wt. percent, will demonstrate that the Standby Liquid Control System meets the requirements of 10 CFR 50.62.

Boron concentration, solution temperature, and volume are checked on a frequency to assure a high reliability of operation of the system should it ever be required. Experience with pump operability indicates that monthly testing is adequate to detect if failures have occurred.

Components of the system are checked periodically as described above and make a functional test of the entire system on a frequency of less than once during each operating cycle unnecessary. A test of one installed explosive charge is made at least once during each operating cycle to assure that the charges have not deteriorated, the actuation circuit is functioning properly, the valve functions properly, and no flow blockages exist. The replacement charge will be selected from a batch for which there has been a successful test firing. Recommendations of the vendor shall be followed in maintaining a five-year life of the explosive charges. A continual check of the firing circuit continuity is provided by pilot lights in the control room.

3.4 LIMITING CONDITION FOR OPERATION BASES (Cont'd.)

The relief valves in the standby liquid control system protect the system piping and positive displacement pumps which are nominally designed for 1500 psig protection from over-pressure. The pressure relief valves discharge back to the standby liquid control solution tank.

B. Only one of the two standby liquid control pumping circuits is needed for proper operation of the system. If one pumping circuit is found to be inoperable, there is no immediate threat to shutdown capability, and reactor operation may continue while repairs are being made. Assurance that the remaining system will perform its intended function and that the reliability of the system is good is obtained by demonstrating operation of the pump in the operable circuit at least once daily.

C. For the maximum solution concentration of 16.5 wt. percent sodium pentaborate, the saturation temperature is 73°F. To guard against boron precipitation, the solution including that in the pump suction piping is kept at least 10°F above the saturation temperature by a tank heater and by heat tracing in the pump suction piping. The 10°F margin is included in Figure 3.4.2. Temperature and liquid level alarms for the system are annunciated in the control room. Figure 3.4.1 provides additional requirements for minimum tank volume based on solution temperature and concentration to ensure adequate net positive suction head exists for one or two pump operation.

Pump operability is checked on a frequency to assure a high reliability of operation of the system should it ever be required.

Once the solution has been made up, boron concentration will not vary unless more boron or more water is added. Level indication and alarm indicate whether the solution volume has changed which might indicate a possible solution concentration change. Considering these factors, the test interval has been established.

4.4 SURVEILLANCE REQUIREMENT BASES

Periodic tests to demonstrate two-pump flow capability are not feasible in the present system configuration and are unnecessary because the flow path integrity can be determined from the test of a single pump. Initial two-pump test data correlation with single-pump test data verified the capability of the piping to support two-pump flow. Periodic single-pump test data is compared to the required flow rate and to the previous test data to identify any significant degradation.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-254

QUAD CITIES NUCLEAR POWER STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 151
License No. DPR-29

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

   A. The application for amendment by Commonwealth Edison Company (the licensee) dated October 15, 1992 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

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

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Facility Operating License No. DPR-29 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 151 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance, and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert M. Pulsifer, Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 16, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 151

FACILITY OPERATING LICENSE NO. DPR-29

DOCKET NO. 50-254

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
vii	vii
3.4/4.4-2	3.4/4.4-2
3.4/4.4-3	3.4/4.4-3
3.4/4.4-4	3.4/4.4-4
3.4/4.4-5	3.4/4.4-5
Figure 3.4-1	Figure 3.4-1

TECHNICAL SPECIFICATIONS

APPENDIX A

LIST OF FIGURES

Number	Title
2.1-1	APRM Flow Reference Scram and APRM Rod Block Settings
2.1-2	Deleted
2.1-3	APRM Flow Bias Scram Relationship to Normal Operating Conditions
4.1-1	Graphical Aid in the Selection of an Adequate Interval Between Tests
4.2-1	Test Interval vs. System Unavailability
3.4-1	Sodium Pentaborate Solution Volume Requirements
3.4-2	Sodium Pentaborate Solution Temperature Requirements
3.5-1	Deleted
3.5-2	Deleted
3.6-1	Pressure Limit as a Function of Vessel Metal Temperature
3.6-2	Deleted
4.6-1	Chloride Stress Corrosion Test Results at 500°F
4.8-1	Locations of Fixed Environmental Radiological Monitoring Stress
6.1-1	Deleted
6.1-2	Deleted
6.1-3	Minimum Shift Manning Chart

Explode two of six charges or two of four charges manufactured in the same batch using the permanent system wiring to verify proper function. Then install the untested charges in the explosion valves.

Demineralized water shall be injected via a test connection into the reactor vessel to test that valves (except explosion valves) not checked by the recirculation test are not clogged.

Test that the setting of the system pressure relief valves is between 1455 and 1545 psig.

3. Disassemble and inspect one explosion valve so that it can be established that the valve is not clogged. Both valves shall be inspected in the course of two operating cycles.

B. Operation with Inoperable Components

From and after the date that a redundant component is made or found to be inoperable, Specification 3.4.A shall be considered fulfilled and continued operation permitted provided that the component is returned to an operable condition within 7 days.

B. Operation with Inoperable Components

When a component becomes inoperable, its redundant component shall be demonstrated to be operable immediately and daily thereafter.

C. Liquid Poison Tank-Boron Concentration

The liquid poison tank shall contain a boron bearing solution of at least 14 weight percent, but not more than 16.5 weight percent sodium pentaborate decahydrate at all times when the standby liquid control system is required to be operable. The available volume and temperature of the sodium pentaborate solution shall be greater than or equal to the limits specified by Figures 3.4.1 and 3.4.2.

C. Liquid Poison Tank-Boron Concentration

The availability of the proper boron-bearing solution shall be verified by performance of the following tests:

1. At least once per month

   Boron concentration shall be determined. In addition, the boron concentration shall be determined any time water or boron are added or if the solution temperature drops below the limits specified by Figure 3.4-2.

2. At least once per day

   The solution volume and temperature shall be verified to be greater than or equal to the limits specified by Figures 3.4-1 and 3.4-2.

3. Deleted.

D. Condition Requiring Reactor Shutdown

If Specifications 3.4.A through C are not met, an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

3.4 LIMITING CONDITION FOR OPERATION BASES

A. The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown assuming that none of the withdrawn control rods can be inserted. To meet this objective, the liquid control system is designed to inject a quantity of boron which produces a concentration of no less than 600 ppm of boron in the reactor core in less than 100 minutes with imperfect mixing. A boron concentration of 600 ppm in the reactor core is required to bring the reactor from full power to a 3% Δk or more subcritical condition considering the hot to cold reactivity swing, xenon poisoning and an addition margin in the reactor core for imperfect mixing of the chemical solution in the reactor water. A normal quantity of 3254 gallons of solution having a 14% sodium pentaborate concentration is required to meet this shutdown requirement. An additional volume of solution is contained below the pump suction and is not available for injection. Other equivalent combinations of increased concentration and reduced volume are also acceptable provided they have considered required temperatures and net positive suction head.

For a required pumping rate of 40 gpm, a minimum of 3254 gallons of at least 14 WT percent solution at $\leq 110^{\circ}F$ will be inserted in less than 100 minutes. This insertion rate of boron solution will override the rate of reactivity insertion due to cooldown of the reactor following the xenon peak. Two pump operation will enable faster reactor shutdown for ATWS events. The minimum gross volume required in the storage tank is dependent on solution temperature (to assure adequate net positive suction head). The monthly pump minimum flowrate test shall require a minimum flowrate of 40 gpm. This requirement, combined with the solution concentration requirement of at least 14 WT percent, will demonstrate that the Standby Liquid Control System meets the requirements of 10 CFR 50.62.

Boron concentration, solution temperature, and volume are checked on a frequency to assure a high reliability of operation of the system should it ever be required. Experience with pump operability indicates that monthly testing is adequate to detect if failures have occurred.

The only practical time to test the standby liquid control system is during a refueling outage and by initiation from local stations. Components of the system are checked periodically as described above and make a functional test of the entire system on a frequency of less than once during each refueling outage unnecessary. A test of explosive charges from one manufacturing batch is made to assure that the charges are satisfactory. A continual check of the firing circuit continuity is provided by pilot lights in the control room.

B. Only one of the two standby liquid control pumping circuits is needed for proper operation of the system. If one pumping circuit is found to be inoperable, there is no immediate threat to shutdown capability, and reactor operation may continue while repairs are being made. Assurance that the remaining system will perform its intended function and that the reliability of the system is good is obtained by demonstrating operation of the pump in the operable circuit at least once daily. A reliability analysis indicates that the plant can be operated safety in this manner for 7 days.

The Standby Liquid Control System is operated by a five position control switch (SYS 1&2, SYS 1, OFF, SYS 2, and SYS 2&1). The single pump operation positions are for operating cycle surveillance testing. This testing demonstrates the capability of firing the explosive trigger assemblies. Also during this testing, sodium pentaborate is circulated from the storage tank, through one suction line, through a pump, and back into the storage tank. This is done separately for each system demonstrating that both suction lines are not plugged. The two pump operation positions will be used for the injection of the sodium pentaborate into the vessel during an ATWS event. By using the two pump operation position, the Standby Liquid Control System will be meeting the requirements of 10 CFR 50.62 (Requirements for reduction of risk from ATWS events for light-water-cooled nuclear power plants).

C. For the maximum solution concentration of 16.5% sodium pentaborate, by weight, the saturation temperature is 73°F. The solution shall be kept at least 10°F above the saturant temperature to guard against boron precipitation The 10°F margin is included in Figure 3.4-2. Temperature and liquid level alarms for the system are annunciated in the control room. Figure 3.4-1 provides additional requirements for minimum tank volume based on solution temperature and concentration to ensure adequate net positive suction head exists for one or two pump operation.

Pump operability is checked on a frequency to assure a high reliability of operation of the system should it ever be required.

Once the solution has been made up, boron concentration will not vary unless more boron or more water is added. Level indication and alarm indicate whether the solution volume has changed, which might indicate a possible solution concentration change. Considering these factors, the test interval has been established.

D. Periodic tests to demonstrate two-pump flow capability are not feasible in the present system configuration and are unnecessary because the flow path integrity can be determined from the test of a single pump. Initial two-pump test data correlation with single-pump test data verified the capability of the piping to support two-pump flow. Periodic single-pump test data is compared to the required flow rate and to the previous test data to identify any significant degradation.

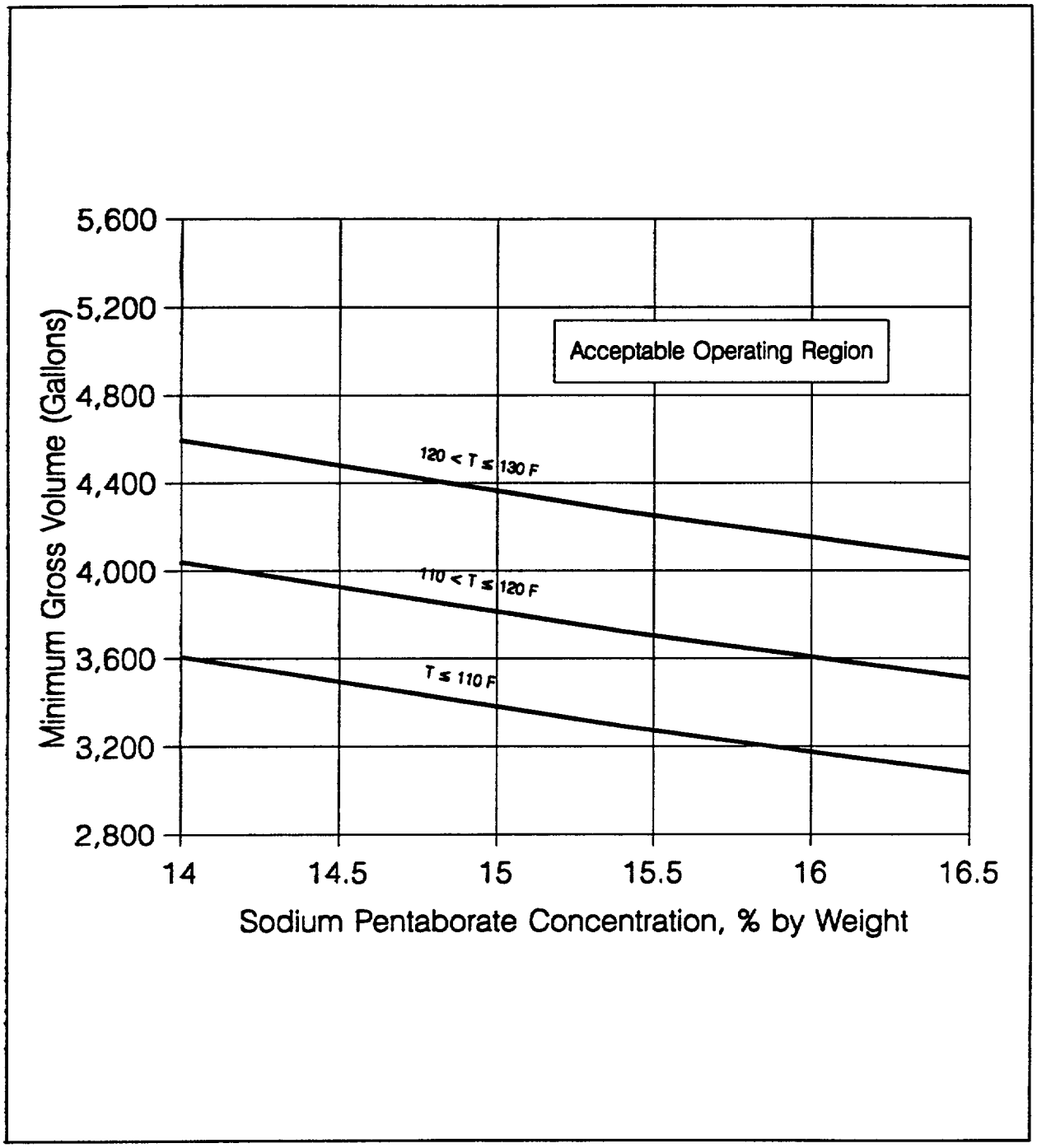

Figure 3.4-1 Sodium Pentaborate Solution Volume Requirements

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-265

QUAD CITIES NUCLEAR POWER STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 147
License No. DPR-30

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

   A. The application for amendment by Commonwealth Edison Company (the licensee) dated October 15, 1992 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

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

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Facility Operating License No. DPR-30 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 147, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance, and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert M. Pulsifer, Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 16, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 147

FACILITY OPERATING LICENSE NO. DPR-30

DOCKET NO. 50-265

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
vii	vii
3.4/4.4-2	3.4/4.4-2
3.4/4.4-3	3.4/4.4-3
3.4/4.4-4	3.4/4.4-4
Figure 3.4-1	Figure 3.4-1

TECHNICAL SPECIFICATIONS

APPENDIX A

LIST OF FIGURES

Number	Title
2.1-1	APRM Flow Reference Scram and APRM Rod Block Settings
2.1-2	Deleted
2.1-3	APRM Flow Bias Scram Relationship to Normal Operating Conditions
4.1-1	Graphical Aid in the Selection of an Adequate Interval Between Tests
4.2-1	Test Interval vs. System Unavailability
3.4-1	Sodium Pentaborate Solution Volume Requirements
3.4-2	Sodium Pentaborate Solution Temperature Requirements
3.5-1	Deleted
3.5-2	Deleted
3.6-1	Pressure Limit as a Function of Vessel Metal Temperature
3.6-2	Deleted
4.6-1	Chloride Stress Corrosion Test Results at 500°F
4.8-1	Locations of Fixed Environmental Radiological Monitoring Stress
6.1-1	Deleted
6.1-2	Deleted
6.1-3	Minimum Shift Manning Chart

Test that the setting of the system pressure relief valves is between 1455 and 1545 psig.

3. Disassemble and inspect one explosion valve so that it can be established that the valve is not clogged. Both valves shall be inspected in the course of two operating cycles.

B. Operation with Inoperable Components

From and after the date that a redundant component is made or found to be inoperable, Specification 3.4.A shall be considered fulfilled and continued operation permitted provided that the component is returned to an operable condition within 7 days.

B. Operation with Inoperable Components

When a component becomes inoperable, its redundant component shall be demonstrated to be operable immediately and daily thereafter.

C. Liquid Poison Tank-Boron Concentration

The liquid poison tank shall contain a boron bearing solution of at least 14 weight percent, but not more than 16.5 weight percent sodium pentaborate decahydrate at all times when the standby liquid control system is required to be operable. The available volume and temperature of the sodium pentaborate solution shall be greater than or equal to the limits specified by Figures 3.4-1 and 3.4-2.

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The availability of the proper boron-bearing solution shall be verified by performance of the following tests:

1. At least once per month

   Boron concentration shall be determined. In addition, the boron concentration shall be determined any time water or boron are added or if the solution temperature drops below the limits specified by Figure 3.4-2.

2. At least once per day

   The solution volume and temperature shall be verified to be greater than or equal to the limits specified by Figures 3.4-1 and 3.4-2.

3. Deleted.

D. If Specifications 3.4.A through C are not met, an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

3.4 LIMITING CONDITIONS FOR OPERATION BASES

A. The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown assuming that none of the withdrawn control rods can be inserted. To meet this objective, the liquid control system is designed to inject a quantity of boron which produces a concentration of no less than 600 ppm of boron in the reactor core in less than 100 minutes with imperfect mixing. A boron concentration of 600 ppm in the reactor core is required to bring the reactor from full power to 3% Δk or more subcritical condition considering the hot to cold reactivity swing, xenon poisoning and an additional margin in the reactor core for imperfect mixing of the chemical solution in the reactor water. A normal quantity of 3,254 gallons of solution having a 14% sodium pentaborate concentration is required to meet this shutdown requirement. An additional volume of solution is contained below the pump suction and is not available for injection. Other equivalent combinations of increased concentration and reduced volume are also acceptable provided they have considered required temperatures and net positive suction head.

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Boron concentration, solution temperature, and volume are checked on a frequency to assure a high reliability of operation of the system should it ever be required. Experience with pump operability indicates that monthly testing is adequate to detect if failures have occurred.

The only practical time to test the standby liquid control system is during a refueling outage and by initiation from local stations. Components of the system are checked periodically as described above and make a functional test of the entire system on a frequency of less than once each refueling outage unnecessary. A test of explosive charges from one manufacturing batch is made to assure that the charges are satisfactory. A continual check of the firing circuit continuity is provided by pilot lights in the control room.

B. Only one of the standby liquid control pumping circuits is needed for proper operation of the system. If one pumping circuit is found to be inoperable, there is no immediate threat to shutdown capability, and reactor operation may continue while repairs are being made. Assurance that the remaining system will perform its intended function and that the reliability of the system is good is obtained by demonstrating operation of the pump in the operable circuit at least once daily. A reliability analysis indicates that the plant can be operated safely in this manner for 7 days.

The Standby Liquid Control System is operated by a five position control switch (SYS 1&2, SYS 1, OFF, SYS 2 and SYS 2&1). The single pump operation positions are for operating cycle surveillance testing. This testing demonstrates the capability of firing the explosive trigger assemblies. Also during this testing, sodium pentaborate is circulated from the storage tank, through one suction line, through a pump, and back into the storage tank. This is done separately for each system demonstrating that both suction lines are not plugged. The two pump operation positions will be used for the injection of the sodium pentaborate into the vessel during an ATWS event. By using the two pump operation position, the Standby Liquid Control System will be meeting the requirements of 10 CFR 50.62 (Requirements for reduction of risk from ATWS events for light-water-cooled nuclear power plants).

C. For the maximum solution concentration of 16.5% sodium pentaborate, by weight, the saturation temperature is 73°F. The solution shall be kept at least 10°F above the saturation temperature to guard against boron precipitation. The 10°F margin is included in Figure 3.4-2. Temperature and liquid level alarms for the system are annunciated in the control room. Figure 3.4-1 provides additional requirements for minimum tank volume based on solution temperature and concentration to ensure adequate net positive suction head exists for one or two pump operation.

Pump operability is checked on a frequency to assure a high reliability of operation of the system should it ever be required.

Once the solution has been made up, boron concentration will not vary unless more boron or more water is added. Level indication and alarm indicate whether the solution volume has changed, which might indicate a possible solution concentration change. Considering these factors, the test interval has been established.

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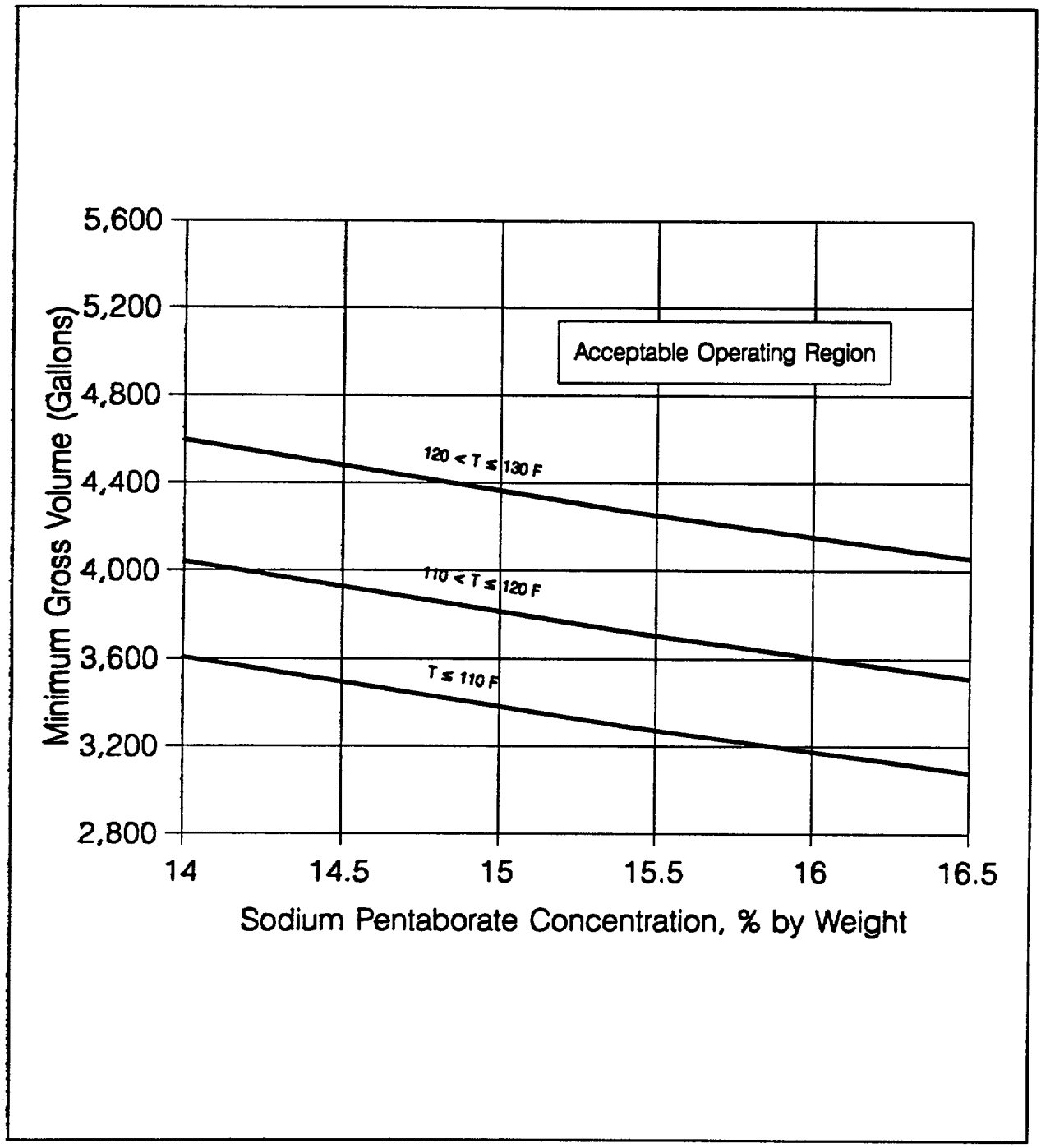

Figure 3.4-1 Sodium Pentaborate Solution Volume Requirements

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 130 TO FACILITY OPERATING LICENSE NO. DPR-19,

AMENDMENT NO. 124 TO FACILITY OPERATING LICENSE NO. DPR-25,

AMENDMENT NO. 151 TO FACILITY OPERATING LICENSE NO. DPR-29

AND AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NO. DPR-30

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-237, 50-249, 50-254 AND 50-265

1.0 INTRODUCTION

NRC Information Notice 91-12, "Potential Loss of Net Positive Suction Head (NPSH) of Standby Liquid Control System Pumps," resulted from a Standby Liquid Control System (SLCS) operability test performed at Quad Cities, Unit 1 on February 11, 1991. The test was being performed to determine if the SLCS could perform its intended function. The results of this test suggested that the SLCS pumps at Quad Cities and Dresden Station might not have adequate NPSH at the highest allowable tank temperature of 120°F and at the lowest tank level. Subsequent testing performed at Dresden, Unit 2 and Quad Cities, Unit 1 demonstrated adequate NPSH to be available for single or dual pump operation with corresponding temperature and tank level restrictions enforced. Calculations were performed for Commonwealth Edison Company (ComEd, the licensee) to determine more accurate requirements for the minimum volume of sodium pentaborate to be maintained in the SLCS storage tank. By letter dated October 15, 1992, the licensee requested that the Dresden, Units 2 and 3, and Quad Cities, Units 1 and 2, Technical Specifications (TS) be modified to permit a wider operating range by varying the concentration of sodium pentaborate decahydrate from 14 to 16.5 weight percent inside the SLCS storage tank. Specifically, the proposed amendment would incorporate a map of acceptable SLCS storage tank levels versus sodium pentaborate solution concentrations.

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2.0 EVALUATION

Quad Cities and Dresden Station are proposing to modify the SLCS storage tank temperature and storage tank level requirements within Section 3/4.4 of the Technical Specifications. The proposed change would provide an acceptable operating region for sodium pentaborate solution volume requirements for the SBLC system that is based on temperature, concentration, and minimum gross volume rather than the current TS which requires a single minimum temperature, concentration, and minimum gross volume. The minimum net and gross SLCS storage tank volumes and levels have been calculated for various maximum storage tank temperatures and sodium pentaborate concentrations.

The licensee has stated that the purpose of these changes is to determine the amount of natural boron that must be injected into the reactor vessel to bring the reactor from full power to a xenon-free, cold shutdown, 3% $\Delta k/k$ subcritical condition, assuming no control rod movement, and to establish a map of acceptable SLCS storage tank levels versus sodium pentaborate solution concentrations. Sargent & Lundy has recently completed calculations that determine the mass of the water in the reactor vessel, the recirculation piping, and the SDC/RHR systems. Current design bases require a minimum concentration of 600 ppm of boron based on the original design specifications for the volume of the reactor vessel and the recirculation loops. An additional 20% of boron, or a total of 720 ppm, was required to conservatively account for the dilution by water of the recent unknown volume in the connected systems.

GE Services Information Letter (SIL) No. 325 informed utilities of calculational results that showed that 2.6% $\Delta k/k$ would shut down a reactor. For the purpose of the licensee's updated calculations, 750 ppm is used as a conservative account of the imperfect mixing and potential losses of sodium pentaborate solution. This conservatism requires a 25% margin to the minimum requirements that both sites must maintain in order to meet safe shutdown requirements.

The minimum concentration of sodium pentaborate required per current Technical Specifications is 14%. The anticipated transients without scram (ATWS) rule requires an injection rate of 86 gpm of 13% solution. For Dresden and Quad Cities, the equivalent injection rate is 80 gpm of 14% solution. By maintaining the minimum equivalent solution, the licensee believes a wider operating range can be achieved by varying the concentration of the sodium pentaborate decahydrate from 14 to 16.5 percent inside the SLCS storage tank. Additionally, the licensee stated that the minimum temperature requirements maintain a ten degree margin above the saturation temperature for any given concentration.

The current and the proposed SLCS TS require a 24-hour surveillance to verify certain characteristics of SLCS (e.g., the volume and temperature of the borated solution in the storage tank), thereby ensuring SLCS operability without disturbing normal plant operation. These surveillances ensure that the proper borated solution volume and temperature are maintained.

Maintaining a minimum specified borated solution temperature is important in ensuring that the boron remains in solution and does not precipitate out in the storage tank or in the pump suction piping. Figure 3.4.2 (3.4-2 for Quad Cities) ensures that a 10°F margin will be maintained above the saturation temperature. This requirement is administratively controlled and verified by site operating personnel during operator's rounds to assure that temperatures remain above the minimum allowable. The 24-hour frequency of these Surveillance Requirements was based on operating experience, which demonstrates relatively slow variations in the measured parameters of volume and temperature.

In the event that the required instrumentation to monitor volume and temperature of the borated solution in the SLCS storage tank is found inoperable, the affected SLCS subsystems are considered inoperable. This is administratively controlled to assure that temperatures and volumes remain above the minimum allowable.

Failure to satisfy the Surveillance Requirements will make the SLCS subsystems inoperable since the boron solution storage tank and the majority of the pump suction piping is common to both subsystems; the appropriate TS limiting conditions for operation would have to be entered.

The above requirements are consistent to the requirements outlined in NUREG-1433, the Improved Standard Technical Specifications (ISTS).

The Staff has reviewed the licensee's proposed TS changes and determined that they are acceptable. This conclusion is based on the following: the results of the calculations and proposed TS changes do not adversely impact the requirements to maintain a minimum sodium pentaborate concentration of 14%; the maintenance of the 14% solution will not affect the ATWS requirements and will permit flexibility in maintaining the equivalent sodium pentaborate solution with no adverse consequences to any previously analyzed accident; and the increased boron in solution will adequately shut down the reactor with additional conservatism.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the

amendments involve no significant hazards consideration, and there has been no public comment on such finding (57 FR 58245). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: John F. Stang, Jr.

Date: November 16, 1994