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

IOWA ELECTRIC LIGHT AND POWER COMPANY
CENTRAL IOWA POWER COOPERATIVE
CORN BELT POWER COOPERATIVE

DOCKET NO. 50-331

DUANE ARNOLD ENERGY CENTER

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 151
License No. DPR-49

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

   A. The application for amendment by Iowa Electric Light and Power Company, et al., dated February 26, 1987, as supplemented June 1, 1987, 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-49 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, 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. The license amendment is effective as of the date of issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Kenneth E. Perkins, Director
Project Directorate III-3
Division of Reactor Projects - III, IV, V and Special Projects

Attachment:
Changes to the Technical Specifications

Date of Issuance: July 7, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 151

FACILITY OPERATING LICENSE NO. DPR-49

DOCKET NO. 50-331

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

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LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
E. Drywell Leak Detection The limiting conditions of operation for the instrumentation that monitors drywell leak detection are given in Table 3.2-E.	E. Drywell Leak Detection Instrumentation shall be calibrated and checked as indicated in Table 4.2-E.
F. Surveillance Information Readouts The limiting conditions for the instrumentation that provides surveillance information readouts are given in Table 3.2-F.	F. Surveillance Information Readouts Instrumentation shall be calibrated and checked as indicated in Table 4.2-F.
G. Recirculation Pump Trips (RPT) and Alternate Rod Insertion (ARI) (ATWS) - RPT/ARI The limiting conditions for operation for the instrumentation that trips the recirculation pumps and initiates Alternate Rod Insertion (ARI) as a means of limiting the consequences of a failure to scram during an anticipated transient are given in Table 3.2-G. (EOC) - RPT The limiting conditions for operation for the instrumentation that trips the recirculation pumps during turbine stop valve or control valve fast closure for transient margin improvement (especially for end of cycle) are given in Table 3.2-G.	G. Recirculation Pump Trips and Alternate Rod Insertion Instrumentation and logic shall be functionally tested, calibrated, and response time tested as indicated on Table 4.2-G.
H. Accident Monitoring Instrumentation The limiting conditions for operation for the accident monitoring instrumentation are given in Table 3.2-H.	H. Accident Monitoring Instrumentation Instrumentation shall be calibrated and checked as indicated in Table 4.2-H in all operational modes other than COLD SHUTDOWN or refueling.

TABLE 3.2-G

INSTRUMENTATION THAT INITIATES RECIRCULATION PUMP TRIP (RPT) AND/OR ALTERNATE ROD INSERTION (ARI)

Minimum Number of Operable Instrument Channels per Trip System (1)	Instrument	Trip Level Setting	Number of Instrument Channels Provided By Design	Action
2	(ATWS) RPT/ARI Reactor High Pressure	$\leq$ 1140 psig	4*	(2) (6)
2	(ATWS) RPT/ARI Reactor Low-Low Water Level	> +119.5 in. Indicated level(5)	4*	(2) (6)
1	(EOC) RPT Logic	N/A	2	(3)
1	(EOC) RPT System (Response Time)	$\leq$ 140 msec (4)	2	(3)

NOTES FOR TABLE 3.2-G

1. Whenever the reactor is in the RUN Mode, there shall be one operable trip system for each parameter. If this cannot be met, the indicated action shall be taken.

2. With one instrument channel inoperable, restore the inoperable instrument channel to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 24 hours. With both instrument channels inoperable, restore at least one instrument channel to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 24 hours.

3. Two EOC RPT systems exist, either of which will trip both recirculation pumps. The systems will be individually functionally tested monthly. If the test period for one RPT system exceeds two consecutive hours, the system will be declared inoperable. If both RPT systems are inoperable or if one RPT system is inoperable for more than 72 consecutive hours, an orderly power reduction shall be initiated and the reactor power shall be less than 85% within four hours.

4. This response time is from initiation of Turbine control valve fast closure or Turbine stop valve closure to actuation of the breaker secondary (auxiliary) contact.

5. Zero referenced to top of active fuel.**

6. If an instrument(s) is inoperable, it may be considered to be OPERABLE if placed in a tripped condition.

*There are 2 instruments per trip system that are arranged in a two-out-of-two once logic.

**Top of active fuel zone is defined to be 344.5" above vessel zero (see bases 3.2).

TABLE 4.2-G

MINIMUM TEST AND CALIBRATION FREQUENCY FOR RECIRCULATION PUMP TRIP (RPT)
AND/OR ALTERNATE ROD INSERTION (ARI)

(ATWS - RPT/ARI)

Instrument Channel	Instrument Functional Check	Calibration Frequency
Reactor High Pressure	Annual	Annual
Reactor Low Water Level	Annual	Annual

System Function Test	Frequency
Recirculation Pump Trip	Once/operating cycle
Alternate Rod Insertion	Once/operating cycle

(EOC - RPT)

Instrument Channel	Functional Check	Calibration Frequency	Instrument Check	Response Time
RPT Initiate Logic	Once/Month	N/A	N/A	N/A
RPT Breaker	Once/Operating Cycle	N/A	N/A	Once/Operating Cycle

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timer is set to annunciate before the values specified in Specification 3.6.C are exceeded. An air sampling system is also provided to detect leakage inside the primary containment.

For each parameter monitored, as listed in Table 3.2.F, there are two (2) channels of instrumentation. By comparing readings between the two (2) channels, a near continuous surveillance of instrument performance is available. Any deviation in readings will initiate an early recalibration, thereby maintaining the quality of the instrument readings.

On July 26, 1984 the NRC published their final rule on Anticipated Transients Without Scram (ATWS), (10 CFR § 50.62). This rule requires all BWR's to make certain plant modifications to mitigate the consequences of the unlikely occurrence of a failure to scram during an anticipated operational transient. The bases for these modifications are described in NEDE-31096-P-A, "Anticipated Transients Without Scram; Response to NRC ATWS Rule, 10 CFR 50.62," December 1985. The Standby Liquid Control System (SLCS) was modified for two-pump operation to provide the minimum required flowrate and boron concentration required by the ATWS rule (see section 3.4 Bases). The existing ATWS Recirculation Pump Trip (RPT) was modified from a one-out-of-two-once logic to trip each recirc. pump to a two-out-of-two-once logic to trip both recirc. pumps ("Monticello" design). This logic will also initiate the Alternate Rod Insertion (ARI) system, which actuates solenoid valves that bleed the air off the scram air header, causing the control rods to insert. The instrument setpoints are chosen such that the normal reactor protection system (RPS) scram setpoints for reactor high pressure or low water level will be exceeded before the ATWS RPT/ARI setpoints are reached. Because ATWS is considered a very low probability event and is outside the normal design basis for the DAEC, the surveillance frequencies and LCO requirements are less stringent than for safety-related instrumentation.

The End-of-Cycle (EOC) recirculation pump trip was added to the plant to improve the operating margin to fuel thermal limits, in particular Minimum Critical Power Ratio (MCPR). The EOC-RPT trips the recirc. pumps to lessen the severity of the power increases caused by either a closure of turbine

stop valves or fast closure of the turbine control valves with reactor power greater than 30% and a simultaneous failure of the turbine bypass valves to open. The operating limit MCPR of section 3.12.C is calculated assuming an operable EOC-RPT system. If the requirements of Table 3.2-G are not met, then the reactor power level is reduced to a level (85% of rated) which will ensure that the full-power MCPR limits of section 3.12.C will not be violated if such a transient were to occur.

Trip function settings are included for instrument a.c. and battery busses for surveillance of undervoltage relays. The undervoltage relays are required to sense a reduction in the power source voltage so that the subject instruments can be transferred to an alternate power source.

Surveillance tests other than a monthly functional check of the bus power monitors for the RHR, Core Spray, ADS, HPCI and RCIC trip systems are not required since they serve as annunciators for complete loss of power and do not monitor reduction of voltage. The subject functional check consists of opening the appropriate circuit breakers and observing the loss of power annunciator activation.

The accident monitoring instrumentation listed in Table 3.2-H were specifically added to comply with the requirements of NUREG-0737 and Generic Letter 83-36. The instrumentation listed is designed to provide plant status for accidents that exceed the design basis accidents discussed in Chapter 15 of the DAEC UFSAR.

Footnote 9 of Table 3.2-H deviates from the guidance of Generic Letter 83-36 as continued operation for 30 days (instead of 7 days as recommended in the generic letter) is allowed with one of two torus water level monitor (TWLM) channels inoperable. Continued operation is justified by the following considerations:

1) Redundancy is available in that at least one channel of the containment water level monitor (CWLM) instrumentation must be available. Since the CWLM envelopes the span measured by the TWLM, the torus water level can be monitored by the CWLM system.

3.4 BASES

Standby Liquid Control System

1. The purpose of the liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown condition 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 that produces a concentration of 600 ppm of boron in the reactor core in less than 96 minutes based on a minimum 26.2 gpm pump rate. The 600 ppm concentration in the reactor core is required to bring the reactor from full power to a subcritical condition, considering the hot to cold reactivity difference, xenon poisoning, analytical biases and uncertainties, etc. The time requirement for inserting the boron solution was selected to override the rate of reactivity insertion caused by cooldown of the reactor following the xenon poison peak. |

   The minimum limitation on the relief valve setting is intended to prevent the recycling of liquid control solution via the lifting of a relief valve at too low a pressure. The upper limit on the relief valve settings provides system protection from overpressure.

2. Although the standby liquid control pump circuitry has been modified to run both pumps simultaneously in order to comply with the ATWS |

rule requirements,* only one of the two standby liquid control pumps is needed for meeting the SLCS design basis. One inoperable pumping circuit does not immediately threaten shutdown capability, and reactor operation can continue while the circuit is being repaired. Assurance that the remaining system will perform its intended function and that the long-term average availability of the system is not reduced is obtained for a one-out-of-two system by an allowable equipment out-of-service time of one third of the normal surveillance frequency. This method determines an equipment out-of-service time of ten days. Additional conservatism is introduced by reducing the allowable out-of-service time to seven days, and by increased testing of the operable redundant component.

3. Level indication and alarm indicate whether the solution volume has changed, which might indicate a possible solution concentration range. The test interval has been established in consideration of these factors. Temperature and liquid level alarms for the system are annunciated in the control room.

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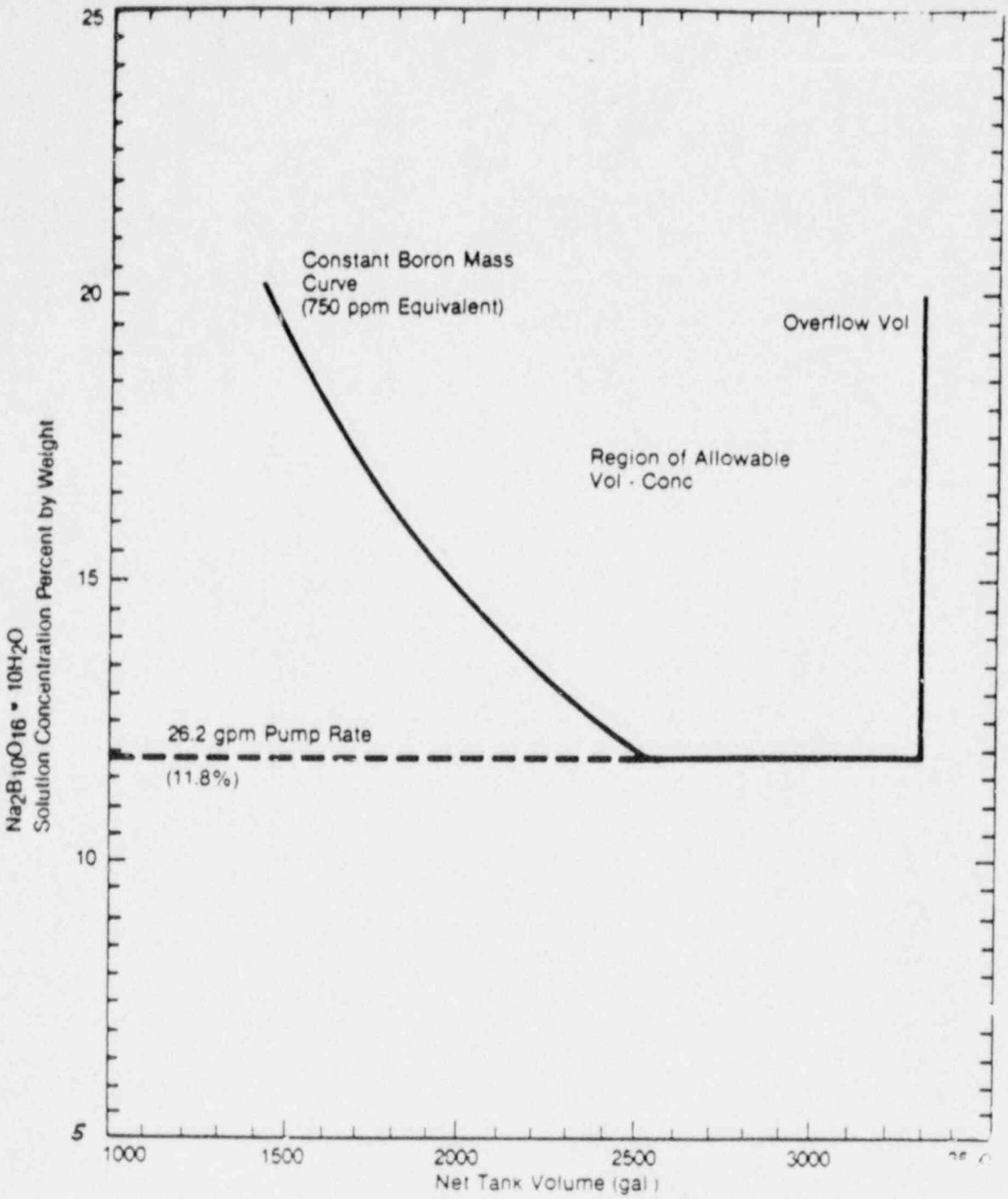
* The NRC's final rule on Anticipated Transients Without Scram (ATWS), 10 CFR § 50.62, requires that the Standby Liquid Control System (SLCS) be modified to provide an equivalent shutdown capability of 86 gpm at 13.4 weight percent natural boron for a 251 inch I.D. vessel. For the DAEC, ATWS equivalence is achieved by running both SLCS pumps simultaneously at a minimum combined flow of 45 gpm at a nominal boron concentration of 13% weight percent natural boron, (NEDC-30859, "Duane Arnold ATWS Assessment," December 1984). (The equivalence is also met if both pumps supply their minimum tech spec flowrate of 26.2 gpm each with a solution concentration of at least 11.2 weight percent natural boron.) Because ATWS is a very low probability event and is considered to be beyond the design basis for the DAEC, the surveillance and LCO requirements need not be more stringent than the original SLCS design basis requirements.

The solution is kept at least 5°F above the saturation temperature to guard against boron precipitation. The margin is included in Figure 3.4-2.

The volume versus concentration requirement of the solution is such that, should evaporation occur from any point within the curve, a low level alarm will annunciate before the temperature versus concentration requirements are exceeded.

The quantity of stored boron includes an additional margin (25 percent) beyond the amount needed to shut down the reactor to allow for possible imperfect mixing of the chemical solution in the reactor water.

A minimum quantity of 2500 gallons of solution having a 11.8 percent sodium pentaborate concentration, or the equivalent as shown in Figure 3.4-1, will ensure that both the SLCS design basis (11.8%) and ATWS (11.2%) shutdown requirements are met. The maximum net storage volume of the boron solution, as established by the overflow, is 3270 gallons.



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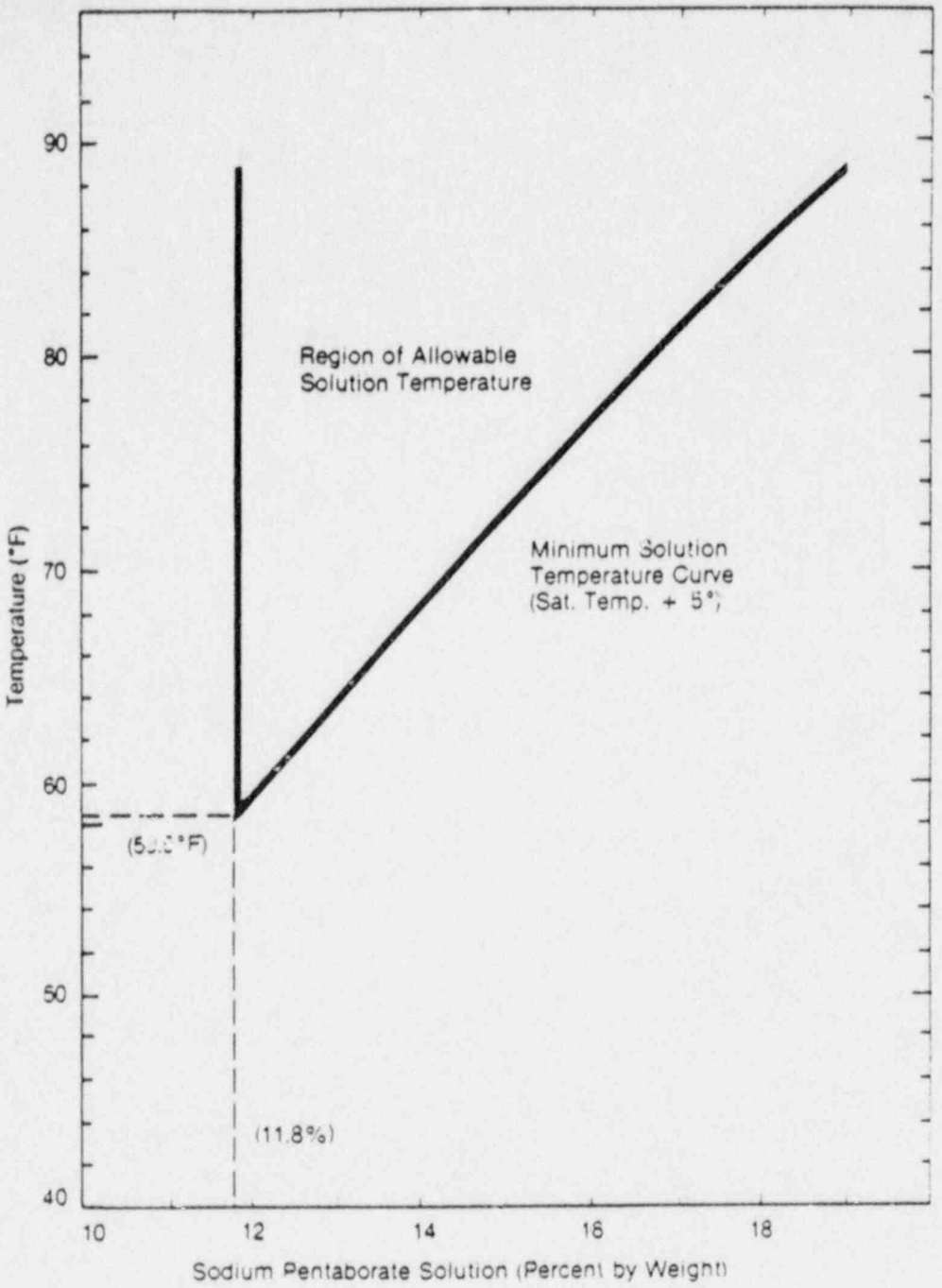
Sodium Pentaborate Solution Volume
Concentration Requirements
FIGURE 3.4-1



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Minimum Temperature of
Sodium Pentaborate Solution
FIGURE 3.4-2