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

May 19, 1982

Docket Nos. 50-237/249/254/265
LS05-82-05-042

Posted
Amdt. 64
to DPR-25

Mr. L. DelGeorge
Director of Nuclear Licensing
Commonwealth Edison Company
Post Office Box 767
Chicago, Illinois 60690

Dear Mr. DelGeorge:

SUBJECT: DEGRADED GRID VOLTAGE PROTECTION

RE: Dresden Station Units No. 2 and 3; Quad Cities Station Units No. 1 and 2

The Commission has issued the enclosed Amendment No. 72 to Provisional Operating License No. DPR-19 for Dresden Station Unit No. 2 and Amendment Nos. 64, 77 and 71 to Facility Operating License Nos. DPR-25, DPR-29 and DPR-30 for Dresden Station Unit Nos. 3 and Quad Cities Station Unit Nos. 1 and 2, respectively. These amendments consist of changes to the Technical Specifications in response to your application dated March 4, 1982, which is supported by your submittals dated July 27, 1977, June 26, 1980, October 1, 1980, October 28, 1981 and January 6, 1982. Your request relates to our Generic Letter dated June 3, 1977.

The amendments approve changes to the provisions of the Appendix A Technical Specifications pertaining to undervoltage protection.

The amendments are to become effective 30 days after installation and testing of the modifications on each unit.

Copies of our Safety Evaluation and the Notice of Issuance are also enclosed.

Sincerely,

Dennis M. Crutchfield

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

Enclosures:
1. Amendment No. 72 to License No. DPR-19
2. Amendment No. 64 to License No. DPR-25
3. Amendment No. 77 to License No. DPR-29
4. Amendment No. 71 to License No. DPR-30
5. Safety Evaluation, including Attachments 1 and 2 (TER's by EG&G)
6. Notice of Issuance

cc w/enclosures:
See next page

Mr. L. DelGeorge

cc
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Counselors at Law
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Mr. B. B. Stephenson
Plant Superintendent
Dresden Nuclear Power Station
Rural Route #1
Morris, Illinois 60450

The Honorable Tom Corcoran
United States House of Representatives
Washington, D. C. 20515

U. S. Nuclear Regulatory Commission
Resident Inspectors Office
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U. S. Environmental Protection Agency
Federal Activities Branch
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ATTN: Regional Radiation Representative
230 South Dearborn Street
Chicago, Illinois 60604

James G. Keppler, Regional Administrator
Nuclear Regulatory Commission, Region III
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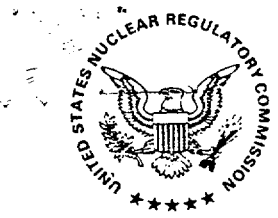
Glen Ellyn, Illinois 60137



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

COMMONWEALTH EDISON COMPANY

DOCKET NO. 50-237

DRESDEN STATION UNIT NO. 2

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No. 72
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 March 4, 1982, as supported by letters dated July 27, 1977, June 26 and October 1, 1980, October 28, 1981 and January 6, 1982, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the 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 Provisional Operating License No. DPR-19 is hereby amended to read as follows:

   3.B Technical Specifications

   The Technical Specifications contained in Appendix A as revised through Amendment No. 72, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment shall become effective 30 days after installation and testing of the modifications.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis M. Crutchfield

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 19, 1982

ATTACHMENT TO LICENSE AMENDMENT NO. 72

PROVISIONAL OPERATING LICENSE NO. DPR-19

DOCKET NO. 50-237

The Appendix "A" Technical Specification revisions are as follows:

REVISED PAGES

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NEW PAGE

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Min. No. of Operable Inst. Channels per Trip System (1)	Trip Function	Trip Level Setting	Remarks
2	Low Pressure Core Cooling Pump Discharge Pressure	50 psig $\leq$p $\leq$100 psig	Defers APR actuation pending confirmation of low pressure core cooling system operation.
2/Bus	Under Voltage on Emergency Buses	$\geq$3092 volts (equals 3255 less 5% tolerance)	1. Initiates starting of diesel generators. 2. Permissive for starting ECCS pumps. 3. Removes nonessential loads from buses.
2	Sustained High Reactor Pressure	$\leq$1070 psig for 15 seconds	Initiates isolation condenser.
2/Bus	Degraded Voltage on 4 KV Emergency Buses	$\geq$3708 volts (equals 3784 volts less 2% tolerance) after $\leq$5 minutes (+5% tolerance) with a 7-second ($\pm$20%) inherent time delay	Initiates alarm and picks up time delay relay. Diesel generator picks up load if degraded voltage not corrected after time delay.

Notes:

1. For all positions of the Reactor Mode Selector Switch (except for the containment interlock) whenever any ECCS subsystem is required to be operable, there shall be two operable or tripped trip systems. If the first column cannot be met for one of the trip systems, that system shall be tripped. If the first column cannot be met for both trip systems, immediately initiate an orderly shutdown to cold conditions.

2. Need not be operable when primary containment integrity is not required.

3. May be bypassed when necessary during purging for containment inerting or deinerting.

4. If an instrument is inoperable, it shall be placed (or simulated) in the tripped condition so that it will not prevent containment spray.

TABLE 4.2.1

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CORE AND CONTAINMENT COOLING SYSTEMS INSTRUMENTATION, ROD BLOCKS, AND ISOLATIONS

Instrument Channel	Instrument Functional Test (2)	Calibration (2)	Instrument Check (2)
CCS INSTRUMENTATION			
1. Reactor Low-Low Water Level	(1)	Once/3 Months	Once/Day
2. Drywell High Pressure	(1)	Once/3 Months	None
3. Reactor Low Pressure	(1)	Once/3 Months	None
4. Containment Spray Interlock			
a. 2/3 Core Height	(1)	Once/3 Months	None
b. Containment High Pressure	(1)	Once/3 Months	None
5. Low Pressure Core Cooling Pump Discharge	(1)	Once/3 Months	None
6. Undervoltage Emergency Bus	Refueling Outage	Refueling Outage	Once/3 months
7. Sustained High Reactor Pressure	(1)	Once/3 Months	None
8. Degraded Voltage Emergency Bus	Refueling Outage (10)	Refueling Outage	Monthly
ROD BLOCKS			
1. APRM Downscale	(1) (3)	Once/3 Months	None
2. APRM Flow Variable	(1) (3)	Refueling Outage	None
3. APRM Upscale (Startup/Hot Standby)	(2) (3)	(2) (3)	(2)
4. IRM Upscale	(2) (3)	(2) (3)	(2)
5. IRM Downscale	(2) (3)	(2) (3)	(2)
6. IRM detector not fully inserted in the core	(2)	N/A	None
7. RBM Upscale	(1) (3)	Refueling Outage	None
8. RBM Downscale	(1) (3)	Once/3 Months	None
9. SRM Upscale	(2) (3)	(2) (3)	(2)
10. SRM Detector Not in Startup Position	(2) (3)	(2) (3)	(2)
11. Scram Instrument Volume Level - High	Once/3 Months (9)	None	None
AIN STEAM LINE ISOLATION			
1. Steam Tunnel High Temperature	Refueling Outage	Refueling Outage	None
2. Steam Line High Flow	(1)	Once/3 Months	Once/Day
3. Steam Line Low Pressure	(1)	Once/3 Months	None
4. Steam Li 'igh Radiation	(1) (3)	Once/3 Months (4)	Once/Day

NOTES:

7. Functional tests will be conducted before startup at the end of each refueling outage or after maintenance is performed on a particular Safety/Relief Valve.

8. If the number of position indicators is reduced to one indication on one or more valves, continued operation is permissible; however, if the reactor is in a shutdown condition, it may not be started up until all position indication is restored. In the event that all position indication is lost on one or more valves and such indication cannot be returned in thirty days, an orderly shutdown shall be initiated, and the reactor shall be depressurized to less than 90 psig in 24 hours.

9. The Functional Test of the Scram Discharge Volume float switch shall include actuation of the switch using a water column.

10. Functional test shall include verification of the second level undervoltage (degraded voltage) timer bypass and shall verify operation of the degraded voltage 5-minute timer and inherent 7-second timer.

3.9 LIMITING CONDITION FOR OPERATION	4.9 SURVEILLANCE REQUIREMENT

3.9 AUXILIARY ELECTRICAL SYSTEMS

Applicability:

Applies to the auxiliary electrical power system.

Objective:

To assure an adequate supply of electrical power during plant operation.

Specification:

A. The reactor shall not be made critical unless all the following requirements are satisfied:

1. One 138 KV line, associated switchgear, and the reserve auxiliary power transformer capable of carrying power to Unit 2.

2. The Dresden 2 diesel generator and the Unit 2/3 diesel generator shall be operable.

3. An additional source of power consisting of one of the following:

   (a) One other 138 KV line, fully operational and capable of carrying auxiliary power to Unit 2.

4.9 AUXILIARY ELECTRICAL SYSTEMS

Applicability:

Applies to the periodic testing requirements of the auxiliary electrical system.

Objective:

Verify the operability of the auxiliary electrical system.

Specification:

A. Station Batteries

1. Every week the specific gravity and voltage of the pilot cell and temperature of adjacent cells and overall battery voltage shall be measured.

2. Every three months the measurements shall be made of voltage of each cell to nearest 0.01 volt, specific gravity of each cell, and temperature of every fifth cell.

3. Every refueling outage, the station batteries shall be subjected to a rated load discharge test. Determine specific gravity and voltage of each cell after the discharge. If this specification has been complied with for a particular battery for Dresden Unit 3, it shall not be required for Dresden Unit 2.

Amendment No. 72

3.9 LIMITING CONDITION FOR OPERATION	4.9 SURVEILLANCE REQUIREMENT
(b) One 345 KV line from Unit 3 capable of carrying auxiliary power to an essential electrical bus of Unit 2 through the 4160 volt bus tie.	
4. (a) 4160 volt buses 23-1 and 24-1 are energized.	
(b) 480 volt buses 28 and 29 are energized.	
5. The unit 24/48 volt batteries, the two station 125 volt batteries and the two station 250 volt batteries and a battery charger for each required battery are operable.	
B. Except when the reactor is in the Cold Shutdown or Refueling modes with the head off, the availability of electric power shall be as specified in 3.9.A, except as specified in 3.9.B.1, 3.9.B.2, and 3.9.B.3.	B. Diesel Fuel Once a month the quantity of diesel fuel available shall be logged. Once a month a sample of diesel fuel shall be checked for quality.
1. From and after the date that incoming power is available from only one line, reactor operation is permissible only during the succeeding seven days unless an additional line is sooner placed in service providing both the Unit 2 and Unit 2/3 emergency diesel generators are operable. From and after the date that incoming power is not available from any line, reactor operation is permissible providing both the Unit 2 and Unit 2/3 emergency diesel generators are operating and all core and containment cooling systems are operable and the AEC is notified within 24 hours of the situation, the precautions to be taken during this situation, and the plans for prompt restoration of incoming power.	

3.9 LIMITING CONDITION FOR OPERATION	4.9 SURVEILLANCE REQUIREMENT
2. From and after the date that one of the diesel generators and/or its associated bus is made or found to be inoperable for any reason, reactor operation is permissible according to Specification 3.5/4.5F and 3.9D only during the succeeding seven days unless such diesel generator and/or bus is sooner made operable, provided that during such seven days the operable diesel generator shall be demonstrated to be operable at least once each day and two off-site lines are available.	
3. From and after the date that one of the two 125/250 battery systems is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days unless such battery system is sooner made operable.	
C. Diesel Fuel	C. Diesel Generator Operability
There shall be a minimum of 10,000 gallons of diesel fuel supply on site for each diesel.	1. Each diesel generator shall be manually started and loaded once each month to demonstrate operational readiness. The test shall continue until both the diesel engine and the generator are at equilibrium conditions of temperature while full load output is maintained.
	2. During the monthly generator test the diesel starting air compressor shall be checked for operation and its ability to recharge air receivers.
	3. During the monthly generator test the diesel fuel oil transfer pumps shall be operated.

3.9 LIMITING CONDITION FOR OPERATION	4.9 SURVEILLANCE REQUIREMENT
D. Diesel Generator Operability Whenever the reactor is in the Cold Shutdown or Refueling modes, a minimum of one diesel generator (either the Dresden 2 diesel generator or the Unit 2/3 diesel generator) shall be operable whenever any work is being done which has the potential for draining the vessel, secondary containment is required, or a core or containment cooling system is required.	4. Additionally, during each refueling outage, a simulated loss of off-site power in conjunction with an ECCS initiation signal test shall be performed on the 4160 volt emergency bus by: (a) Verifying de-energization of the emergency buses and load shedding from the emergency buses. (b) Verifying the diesel starts from ambient condition on the auto-start signal, energizes the emergency buses with permanently connected loads, energizes the auto-connected emergency loads through the load sequencer, and operates for $\geq$5 minutes while its generator is loaded with the emergency loads.

4.9 A. Although station batteries will deteriorate with time, utility experience indicates there is almost no possibility of precipitous failure. The type of surveillance described in this specification is that which has been demonstrated over the years to provide an indication of a cell becoming irregular or unserviceable long before it becomes a failure.

In addition, the checks described also provide adequate indication that the batteries have the specified ampere hour capability.

B. The diesel fuel oil quality must be checked to ensure proper operation of the diesel generators. Water content should be minimized because water in the fuel would contribute to excessive corrosion of the system causing decreased reliability. The growth of micro-organisms results in slime formations which are one of the chief causes of jellying in hydro-carbon fuels. Minimizing of such slimes is also essential to assuring high reliability.

C. The monthly test of the diesel generator is conducted to check for equipment failures and deterioration. Testing is conducted up to equilibrium operating conditions to demonstrate proper operation at these conditions. The diesel will be manually started, synchronized to the bus and load picked up. The diesel shall be loaded to at least half load to prevent fouling of the engineer. It is expected that the diesel generator will be run for one to two hours. Diesel generator experience at other Commonwealth Edison generating stations indicates that the testing frequency is adequate and provides a high reliability of operation should the system be required. In addition, during the test when the generator is synchronized to the bus, it is also synchronized to the off-site power source and thus not completely independent of this source. To maintain the maximum amount of independence, a thirty-day testing interval is also desirable.

Each diesel generator has two air compressors and four air receiver tanks for starting. It is expected that the air compressors will run only infrequently. During the monthly check of the diesel, the receivers will be drawn down below the point at which the compressor automatically starts to check operation and the ability of the compressors to recharge the receivers. Pressure indicators are provided on each of the receivers.

Following the monthly test of the diesels, the fuel oil day tank will be approximately ½ full based on a two-hour test at full load and 205 gallons per hour at full load. At the end of the monthly load test of the diesel generators, the fuel oil transfer pumps will be operated to refill the day tank and to check the operation of these pumps from the emergency source. The test of the emergency diesel generator during the refueling outage will be more comprehensive in that it will functionally test the system; i.e., it will check diesel starting and closure of diesel breaker and sequencing of loads on the diesel. The diesel will be started by simulation of a loss of coolant accident. In addition, an undervoltage condition will be imposed to simulate a loss of off-site power. The timing sequence will be checked to assure proper loading in the time required. The only load on the diesel is that due to friction and windage and a small amount bypass flow on each pump. Periodic tests between refueling outages verify the ability of the diesel to run at full load and the core and containment cooling pumps to deliver full flow. Periodic testing of the various components plus a functional test at a refueling interval are sufficient to maintain adequate reliability.

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

COMMONWEALTH EDISON COMPANY

DOCKET NO. 50-249

DRESDEN STATION UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 64
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 March 4, 1982, as supported by letters dated July 27, 1977, June 26 and October 1, 1980, October 28, 1981 and January 6, 1982, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the 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:

   3.B Technical Specifications

   The Technical Specifications contained in Appendix A as revised through Amendment No. 64 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment shall become effective 30 days after installation and testing of the modifications.

FOR THE NUCLEAR REGULATORY COMMISSION

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 19, 1982

ATTACHMENT TO LICENSE AMENDMENT NO. 64

FACILITY OPERATING LICENSE NO. DPR-25

DOCKET NO. 50-249

The Appendix "A" Technical Specification revisions are as follows:

REVISED PAGES

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NEW PAGE

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Min. No. of Operable Inst. Channels per Trip System (1)	Trip Function	Trip Level Setting	Remarks
2	Low Pressure Core Cooling Pump Discharge Pressure	50 psig $\leq$p $\leq$100 psig	Defers APR actuation pending confirmation of low pressure core cooling system operation.
2/Bus	Under Voltage on Emergency Buses	$\geq$3092 volts (equals 3255 less 5% tolerance)	1. Initiates starting of diesel generators. 2. Permissive for starting ECCS pumps. 3. Removes nonessential loads from buses.
2	Sustained High Reactor Pressure	$\leq$1070 psig for 15 seconds	Initiates isolation condenser.
2/Bus	Degraded Voltage on 4 KV Emergency Buses	$\geq$3708 volts (equals 3784 volts less 2% tolerance) after $\leq$5 minutes (+5% tolerance) with a 7-second ($\pm$20%) inherent time delay	Initiates alarm and picks up time delay relay. Diesel generator picks up load if degraded voltage not corrected after time delay.

Notes:

1. For all positions of the Reactor Mode Selector Switch (except for the containment interlock) whenever any ECCS subsystem is required to be operable, there shall be two operable or tripped trip systems. If the first column cannot be met for one of the trip systems, that system shall be tripped. If the first column cannot be met for both trip systems, immediately initiate an orderly shutdown to cold conditions.
2. Need not be operable when primary containment integrity is not required.
3. May be bypassed when necessary during purging for containment inerting or deinerting.
4. If an instrument is inoperable, it shall be placed (or simulated) in the tripped condition so that it will not prevent containment spray.

TABLE 4.2.1

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CORE AND CONTAINMENT COOLING SYSTEMS INSTRUMENTATION, ROD BLOCKS, AND ISOLATIONS

Instrument Channel	Instrument Functional Test (2)	Calibration (2)	Instrument Check (2)
ECCS INSTRUMENTATION			
1. Reactor Low-Low Water Level	(1)	Once/3 Months	Once/Day
2. Drywell High Pressure	(1)	Once/3 Months	None
3. Reactor Low Pressure	(1)	Once/3 Months	None
4. Containment Spray Interlock			
a. 2/3 Core Height	(1)	Once/3 Months	None
b. Containment High Pressure	(1)	Once/3 Months	None
5. Low Pressure Core Cooling Pump Discharge	(1)	Once/3 Months	None
6. Undervoltage Emergency Bus	Refueling Outage	Refueling Outage	Once/3 months
7. Sustained High Reactor Pressure	(1)	Once/3 Months	None
8. Degraded Voltage Emergency Bus	Refueling Outage (10)	Refueling Outage	Monthly
ROD BLOCKS			
1. APRM Downscale	(1) (3)	Once/3 Months	None
2. APRM Flow Variable	(1) (3)	Refueling Outage	None
3. APRM Upscale (Startup/Hot Standby)	(2) (3)	(2) (3)	(2)
4. IRM Upscale	(2) (3)	(2) (3)	(2)
5. IRM Downscale	(2) (3)	(2) (3)	(2)
6. IRM detector not fully inserted in the core	(2)	N/A	None
7. RBM Upscale	(1) (3)	Refueling Outage	None
8. RBM Downscale	(1) (3)	Once/3 Months	None
9. SRM Upscale	(2) (3)	(2) (3)	(2)
10. SRM Detector Not in Startup Position	(2) (3)	(2) (3)	(2)
11. Scram Instrument Volume Level - High	Once/3 Months (9)	None	None
MAIN STEAM LINE ISOLATION			
1. Steam Tunnel High Temperature	Refueling Outage	Refueling Outage	None
2. Steam Line High Flow	(1)	Once/3 Months	Once/Day
3. Steam Line Low Pressure	(1)	Once/3 Months	None
4. Steam [illegible] High Radiation	(1) (3)	Once/3 Months (4)	Once/D[illegible]

TABLE 4.1 (Cont.)

NOTES:

7. Functional tests will be conducted before startup at the end of each refueling outage or after maintenance is performed on a particular Safety/Relief Valve.

8. If the number of position indicators is reduced to one indication on one or more valves, continued operation is permissible; however, if the reactor is in a shutdown condition, it may not be started up until all position indication is restored. In the event that all position indication is lost on one or more valves and such indication cannot be returned in thirty days, an orderly shutdown shall be initiated, and the reactor shall be depressurized to less than 90 psig in 24 hours.

9. The Functional Test of the Scram Discharge Volume float switch shall include actuation of the switch using a water column.

10. Functional test shall include verification of the second level undervoltage (degraded voltage) timer bypass and shall verify operation of the degraded voltage 5-minute timer and inherent 7-second timer.

3.9 LIMITING CONDITION FOR OPERATION

3.9 AUXILIARY ELECTRICAL SYSTEMS

Applicability:

Applies to the auxiliary electrical power system.

Objective:

To assure an adequate supply of electrical power during plant operation.

Specification:

A. The reactor shall not be made critical unless all the following requirements are satisfied:

1. One 345 KV line, associated switchgear, and the reserve auxiliary power transformer capable of carrying power to Unit 3.

2. The Dresden 3 diesel generator and the Unit 2/3 diesel generator shall be operable.

3. An additional source of power consisting of one of the following:

   (a) One other 345 KV line, fully operational and capable of carrying auxiliary power to Unit 3.

4.9 SURVEILLANCE REQUIREMENT

4.9 AUXILIARY ELECTRICAL SYSTEMS

Applicability:

Applies to the periodic testing requirements of the auxiliary electrical system.

Objective:

Verify the operability of the auxiliary electrical system.

Specification:

A. Station Batteries

1. Every week the specific gravity and voltage of the pilot cell and temperature of adjacent cells and overall battery voltage shall be measured.

2. Every three months the measurements shall be made of voltage of each cell to nearest 0.01 volt, specific gravity of each cell, and temperature of every fifth cell.

3. Every refueling outage, the station batteries shall be subjected to a rated load discharge test. Determine specific gravity and voltage of each cell after the discharge.

3.9 LIMITING CONDITION FOR OPERATION	4.9 SURVEILLANCE REQUIREMENT
(b) One 138 KV line from Unit 2 capable of carrying auxiliary power to an essential electrical bus of Unit 3 through the 4160 volt bus tie.	
4. (a) 4160 volt buses 33-1 and 34-1 are energized.	
(b) 480 volt buses 38 and 39 are energized.	
5. The unit 24/48 volt batteries, the two station 125 volt batteries and the two station 250 volt batteries and a battery charger for each required battery are operable.	
B. Except when the reactor is in the Cold Shutdown or Refueling modes with the head off, the availability of electric power shall be as specified in 3.9.A, except as specified in 3.9.B.1, 3.9.B.2, and 3.9.B.3.	B. Diesel Fuel Once a month the quantity of diesel fuel available shall be logged. Once a month a sample of diesel fuel shall be checked for quality.
1. From and after the date that incoming power is available from only one line, reactor operation is permissible only during the succeeding seven days unless an additional line is sooner placed in service providing both the Unit 3 and Unit 2/3 emergency diesel generators are operable. From and after the date that incoming power is not available from any line, reactor operation is permissible providing both the Unit 3 and Unit 2/3 emergency diesel generators are operating and all core and containment cooling systems are operable and the AEC is notified within 24 hours of the situation, the precautions to be taken during this situation, and the plans for prompt restoration of incoming power.	

3.9 LIMITING CONDITION FOR OPERATION	4.9 SURVEILLANCE REQUIREMENT
2. From and after the date that one of the diesel generators and/or its associated bus is made or found to be inoperable for any reason, reactor operation is permissible according to Specification 3.5/4.5F and 3.9D only during the succeeding seven days unless such diesel generator and/or bus is sooner made operable, provided that during such seven days the operable diesel generator shall be demonstrated to be operable at least once each day and two off-site lines are available.	
3. From and after the date that one of the two 125/250 battery systems is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days unless such battery system is sooner made operable.	
C. Diesel Fuel	C. Diesel Generator Operability
There shall be a minimum of 10,000 gallons of diesel fuel supply on site for each diesel.	1. Each diesel generator shall be manually started and loaded once each month to demonstrate operational readiness. The test shall continue until both the diesel engine and the generator are at equilibrium conditions of temperature while full load output is maintained.
	2. During the monthly generator test the diesel starting air compressor shall be checked for operation and its ability to recharge air receivers.
	3. During the monthly generator test the diesel fuel oil transfer pumps shall be operated.

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

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-254

QUAD CITIES STATION UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 77
License No. DPR-29

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

   A. The application for amendment by the Commonwealth Edison Company (the licensee) dated March 4, 1982, as supported by letters dated July 27, 1977, June 26 and October 1, 1980, October 28, 1981 and January 6, 1982, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the 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:

   3.B Technical Specifications

   The Technical Specifications contained in Appendix A as revised through Amendment No. 77, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment shall become effective 30 days after installation and testing of the modifications.

FOR THE NUCLEAR REGULATORY COMMISSION

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 19, 1982

3.9 LIMITING CONDITION FOR OPERATION	4.9 SURVEILLANCE REQUIREMENT
D. Diesel Generator Operability Whenever the reactor is in the Cold Shutdown or Refueling modes, a minimum of one diesel generator (either the Dresden 3 diesel generator or the Unit 2/3 diesel generator) shall be operable whenever any work is being done which has the potential for draining the vessel, secondary containment is required, or a core or containment cooling system is required.	4. Additionally, during each refueling outage, a simulated loss of off-site power in conjunction with an ECCS initiation signal test shall be performed on the 4160 volt emergency bus by: (a) Verifying de-energization of the emergency buses and load shedding from the emergency buses. (b) Verifying the diesel starts from ambient condition on the auto-start signal, energizes the emergency buses with permanently connected loads, energizes the auto-connected emergency loads through the load sequencer, and operates for $\geq$5 minutes while its generator is loaded with the emergency loads.

4.9 A. Although station batteries will deteriorate with time, utility experience indicates there is almost no possibility of precipitous failure. The type of surveillance described in this specification is that which has been demonstrated over the years to provide an indication of a cell becoming irregular or unserviceable long before it becomes a failure.

In addition, the checks described also provide adequate indication that the batteries have the specified ampere hour capability.

B. The diesel fuel oil quality must be checked to ensure proper operation of the diesel generators. Water content should be minimized because water in the fuel would contribute to excessive corrosion of the system causing decreased reliability. The growth of micro-organisms results in slime formations which are one of the chief causes of jellying in hydro-carbon fuels. Minimizing of such slimes is also essential to assuring high reliability.

C. The monthly test of the diesel generator is conducted to check for equipment failures and deterioration. Testing is conducted up to equilibrium operating conditions to demonstrate proper operation at these conditions. The diesel will be manually started, synchronized to the bus and load picked up. The diesel shall be loaded to at least half load to prevent fouling of the engineer. It is expected that the diesel generator will be run for one to two hours. Diesel generator experience at other Commonwealth Edison generating stations indicates that the testing frequency is adequate and provides a high reliability of operation should the system be required. In addition, during the test when the generator is synchronized to the bus, it is also synchronized to the off-site power source and thus not completely independent of this source. To maintain the maximum amount of independence, a thirty-day testing interval is also desirable.

Each diesel generator has two air compressors and four air receiver tanks for starting. It is expected that the air compressors will run only infrequently. During the monthly check of the diesel, the receivers will be drawn down below the point at which the compressor automatically starts to check operation and the ability of the compressors to recharge the receivers. Pressure indicators are provided on each of the receivers.

Following the monthly test of the diesels, the fuel oil day tank will be approximately ½ full based on a two-hour test at full load and 205 gallons per hour at full load. At the end of the monthly load test of the diesel generators, the fuel oil transfer pumps will be operated to refill the day tank and to check the operation of these pumps from the emergency source. The test of the emergency diesel generator during the refueling outage will be more comprehensive in that it will functionally test the system; i.e., it will check diesel starting and closure of diesel breaker and sequencing of loads on the diesel. The diesel will be started by simulation of a loss of coolant accident. In addition, an undervoltage condition will be imposed to simulate a loss of off-site power. The timing sequence will be checked to assure proper loading in the time required. The only load on the diesel is that due to friction and windage and a small amount bypass flow on each pump. Periodic tests between refueling outages verify the ability of the diesel to run at full load and the core and containment cooling pumps to deliver full flow. Periodic testing of the various components plus a functional test at a refueling interval are sufficient to maintain adequate reliability.

ATTACHMENT TO LICENSE AMENDMENT NO. 77

FACILITY OPERATING LICENSE NO. DPR-29

DOCKET NO. 50-254

Revise the Appendix "A" Technical Specifications by deleting the following pages and inserting the enclosed pages.

PAGES

3.2/4.2-12

3.2/4.2-13

3.2/4.2-16

3.2/4.2-17

3.9/4.9-1

3.9/4.9-3

3.9/4.9-4

TABLE 3.2-2

INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Minimum Number of Operable or Tripped Instrument Channels[1]	Trip Function	Trip Level Setting	Remarks
4	Reactor low low water level	≥84 inches (+ 4 inches/-0 inch) above top of active fuel*	1. In conjunction with low-reactor pressure initiates core spray and LPCI. 2. In conjunction with high-drywell pressure 120-second time delay and low-pressure core cooling interlock initiates auto blowdown. 3. Initiates HPCI and RCIC. 4. Initiates starting of diesel generators.
4[4]	High-drywell pressure[2],[3]	≤2 psig	1. Initiates core spray, LPCI, HPCI, and SGTS. 2. In conjunction with low low water level, 120-second time delay, and low-pressure core cooling interlock initiates auto blowdown. 3. Initiates starting of diesel generators. 4. Initiates isolation of control room ventilation.
2	Reactor low pressure	300 psig≤p≤350 psig	1. Permissive for opening core spray and LPCI admission valves. 2. In conjunction with low low reactor water level initiates core spray and LPCI.
	Containment spray interlock		Prevents inadvertent operation of containment spray during accident conditions.
2[3] 4[3]	2/3 core height containment high pressure	≥2/3 core height 0.5 psig≤p≤1.5 psig	
2	Timer auto blowdown	≤120 seconds	In conjunction with low low reactor water level, high-drywell pressure, and low-pressure core cooling interlock initiates auto blowdown.
4	Low-pressure core cooling pump discharge pressure	100 psig≤p≤150 psig	Defers APR actuation pending confirmation of low-pressure core cooling system operation.
2/BUS[5]	Undervoltage on emergency buses	$3045 \pm 5\%$ volts	1. Initiates starting of diesel generators. 2. Permissive for starting ECCS pumps. 3. Removes nonessential loads from buses. 4. Bypasses degraded voltage timer.

*Top of active fuel is defined as 350" above vessel zero for all water levels used in the LOCA analysis.

TABLE 3.2-2 (Cont'd)

Minimum Number of Operable or Tripped Instrument Channels (1)	Trip Function	Trip Level Setting	Remarks
2(5)/Bus	Degraded Voltage on 4 KV Emergency Buses	3840 volts ± 2% with 5 ± 5% minute time delay and 7 ± 20% second inherent time delay	Initiates alarm and picks up time delay relay. Diesel Generator picks up load if degraded voltage not corrected after time delay.

NOTES

1. For all positions of the reactor mode selector switch (except for the containment interlock) whenever any ECCS subsystem is required to be operable, there shall be two operable trip systems. If the first column cannot be met for one or both of the trip systems, the systems actuated shall be declared inoperable and Specifications 3.5 or 3.9 shall govern.

2. Need not be operable when primary containment integrity is not required.

3. If an instrument is inoperable, it shall be placed (or simulated) in the tripped condition so that it will not prevent containment spray.

4. There are a total of eight high drywell pressure sensors. Four are used for core spray and LPCI initiation, and four are used for HPCI and auto blowdown initiation. This specification applies to each set of four sensors.

5. With the number of operable channels one less than the total number of channels, operation may proceed until performance of the next required functional test, provided the inoperable channel is placed in the tripped condition within one hour.

Amendment No. 77

TABLE 4.2-1

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CORE AND CONTAINMENT COOLING SYSTEMS INSTRUMENTATION, ROD BLOCKS, AND ISOLATIONS[7]

Instrument Channel	Instrument Functional Test[2]	Calibration[2]	Instrument Check[2]
ECCS Instrumentation			
1. Reactor low-low water level	(1)	Once/3 months	Once/day
2. Drywell high pressure	(1)	Once/3 months	None
3. Reactor low pressure	(1)	Once/3 months	None
4. Containment spray interlock			
a. 2/3 core height	(1)	Once/3 months	None
b. Containment pressure	(1)	Once/3 months	None
5. Low-pressure core cooling pump discharge	(1)	Once/3 months	None
6. Undervoltage 4-kV essential	Refueling outage	Refueling outage	Once/3 months
7. Degraded voltage 4kv essential busses	Refueling[8] outage	Refueling Outage	Once/month
Rod Blocks			
1. APRM downscale	(1) (3)	Once/3 months	None
2. APRM flow variable	(1) (3)	Refueling outage	None
3. IRM upscale	(5) (3)	(5) (3)	None
4. IRM downscale	(5) (3)	(5) (3)	None
5. RBM upscale	(1) (3)	Refueling outage	None
6. RBM downscale	(1) (3)	Once/3 months	None
7. SRM upscale	(5) (3)	(5) (3)	None
8. SRM detector not in startup position	(5) (3)	(6)	None
9. IRM detector not in startup position	(5)	(6)	None
10. SRM downscale	(5) (3)	(5) (3)	None
11. High water level in scram discharge volume	Refueling outage	Not applicable	None
Main Steamline Isolation			
1. Steam tunnel high temperature	Refueling outage	Refueling outage	None
2. Steamline high flow	(1)	Once/3 months	Once/day
3. Steamline low pressure	(1)	Once/3 months	None
4. Steamline high radiation	(1) (4)	Refueling outage	Once/day
5. Reactor low low water level	(1)	Once/3 months	Once/day
RCIC Isolation			
1. Steamline high flow	Once/3 months	Once/3 months	None
2. Turbine area high temperature	Refueling outage	Refueling outage	None
3. Low reactor pressure	Once/3 months	Once/3 months	None

Amendment No. 77

TABLE 4.2-1 (Cont'd)

Instrument Channel	Instrument Functional Test[2]	Calibration[2]	Instrument Check[2]
HPCI Isolation			
1. Steamline high flow	(1)	Once/3 months	None
2. Steamline area high temperature	Refueling outage	Refueling outage	None
3. Low reactor pressure	(1)	Once/3 months	None
Reactor Building Ventilation System Isolation And Standby Treatment System Initiation			
1. Ventilation exhaust duct radiation monitors	(1)	Once/3 months	Once/day
2. Refueling floor radiation monitors	(1)	Once/3 months	Once/day
Steam Jet Air Ejector Off-Gas Isolation			
1. Off-gas radiation monitors	(1) (4)	Refueling outage	Once/day
Control Room Ventilation System Isolation			
1. Reactor low water level	(1)	Once/3 months	Once/day
2. Drywell high pressure	(1)	Once/3 months	None
3. Main steamline high flow	(1)	Once/3 months	Once/day
4. Ventilation exhaust duct radiation monitors	(1)	Once/3 months	Once/day

Notes

1. Initially once per month until exposure hours (M as defined on Figure 4.1-1) are 2.0×10^5, thereafter, according to Figure 4.1-1 with an interval not less than 1 month nor more than 3 months. The compilation of instrument failure rate data may include data obtained from other boiling water reactors for which the same design instrument operates in an environment similar to that of Quad-Cities Units 1 and 2.
2. Functional tests, calibrations, and instrument checks are not required when these instruments are not required to be operable or are tripped.
3. This instrumentation is excepted from the functional test definition. The functional test shall consist of injecting a simulated electrical signal into the measurement channel.
4. This instrument channel is excepted from the functional test definitions and shall be calibrated using simulated electrical signals once every 3 months.
5. Functional tests shall be performed before each startup with a required frequency not to exceed once per week. Calibrations shall be performed during each startup or during controlled shutdowns with a required frequency not to exceed once per week.
6. The positioning mechanism shall be calibrated every refueling outage.
7. Logic system functional tests are performed as specified in the applicable section for these systems.
8. Functional test shall include verification of operation of the degraded voltage 5-minute timer and 7-second inherent timer.

Amendment No. 77

3.9/4.9 AUXILIARY ELECTRICAL SYSTEMS

LIMITING CONDITIONS FOR OPERATION

Applicability:

Applies to the auxiliary electrical power system.

Objective:

To assure an adequate supply of electrical power during plant operation.

SURVEILLANCE REQUIREMENTS

Applicability:

Applies to the periodic testing requirement of the auxiliary electrical system.

Objective:

To verify the operability of the auxiliary electrical system.

SPECIFICATIONS

A. Normal and Emergency A-C Auxiliary Power

The reactor shall not be made critical unless all the following requirements are satisfied.

1. The Unit diesel generator and the Unit 1/2 diesel generator shall be operable.

A. Normal and Emergency A-C Auxiliary Power

1. a. Each diesel generator shall be manually started and loaded once each month to demonstrate operational readiness. The test shall continue until both the diesel engine and the generator are at equilibrium conditions of temperature while full load output is maintained.

   b. During the monthly generator test, the diesel-starting air compressor shall be checked for operation and its ability to recharge air receivers.

   c. During the monthly generator test, the diesel fuel oil transfer pumps shall be operated.

2. One 345-kV line, associated switchgear, and the reserve auxiliary power transformer capable of carrying power

2. The status of the 345-kV lines, associated switchgear, and the reserve auxiliary power transformer shall be

unless an additional line is sooner placed in service, providing both the Unit and Unit 1/2 emergency diesel generators are operable.

2. From and after the date the incoming power is not available from any line, continued reactor operation is permissible providing both the Unit and Unit 1/2 emergency diesel generators are operating, all core and containment cooling systems are operable, reactor power level is reduced to 40% of rated, and the NRC is notified within 24 hours of the situation, the precautions to be taken during this period, and the plans for prompt restoration of incoming power.

3. From and after the date that one of the two 125/250-volt battery systems is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 3 days unless such battery system is sooner made operable.

D. Diesel Fuel

There shall be a minimum of 10,000 gallons of diesel fuel supply on site for each diesel generator.

D. Diesel Fuel

Once a month the quantity of diesel fuel available shall be logged.

Once a month a sample of diesel fuel shall be checked for quality.

E. Diesel-Generator Operability

1. Whenever the reactor is in the Startup/Hot Standby or Run mode and the unit or shared diesel generators and/or their respective associated buses are made or found to be inoperable for any reason, except as specified in Specification 3.9.E.2 below, continued reactor operation is permissible only during the succeeding 7 days provided that all of the low-pressure core cooling and all loops of the containment cooling mode of the RHR system associated with the operable diesel generator shall be operable, and two offsite lines are available. If this requirement cannot be met, an orderly shutdown shall be initiated and the

E. Diesel-Generator Operability

1. When it is determined that either the unit or shared diesel generator is inoperable, all low-pressure core cooling systems and all loops of the containment cooling modes of the RHR system associated with the operable diesel generator shall be demonstrated to be operable immediately and daily thereafter. The operable diesel generator shall be demonstrated to be operable immediately and daily thereafter.

2. During each refueling outage, a simulated loss of off-site power in conjunction with an ECCS initiation signal test shall be performed on the 4160 volt emergency bus by:

Amendment No. 77

reactor shall be in the cold shutdown condition within 24 hours.

2. Specification 3.9.E.1 shall not apply when a diesel generator has been made inoperable for a period not to exceed 1-1/2 hours for the purpose of conducting preventative maintenance. Additionally, preventative maintenance shall not be undertaken unless two off site lines are available and the alternate diesel generator has been demonstrated to be operable.

3. Whenever the reactor is in the Cold Shutdown or Refueling mode, a minimum of one diesel generator (either the Unit diesel generator or the Unit 1/2 diesel generator) shall be operable whenever any work is being done which has the potential for draining the vessel, secondary containment is required, or a core or containment cooling system is required.

a. Verifying de-energization of the emergency buses, and load shedding from the emergency buses.

b. Verifying the diesel starts from ambient condition on the auto-start signal, energizes the emergency buses with permanently connected loads, energizes the auto-connected emergency loads through the load sequencer, and operates for greater than 5 minutes while its generator is loaded with the emergency loads.

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

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-265

QUAD CITIES STATION UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 71
License No. DPR-30

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

   A. The application for amendment by the Commonwealth Edison Company (the licensee) dated March 4, 1982, as supported by letters dated July 27, 1977, June 26 and October 1, 1980, October 28, 1981 and January 6, 1982, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the 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:

   3.B Technical Specifications

   The Technical Specifications contained in Appendix A as revised through Amendment No. 71, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment shall become effective 30 days after installation and testing of the modifications.

FOR THE NUCLEAR REGULATORY COMMISSION

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 19, 1982

ATTACHMENT TO LICENSE AMENDMENT NO. 71

FACILITY OPERATING LICENSE NO. DPR-30

DOCKET NO. 50-265

Revise the Appendix "A" Technical Specifications by deleting the following pages and inserting the enclosed pages.

PAGES
3.2/4.2-12
3.2/4.2-13
3.2/4.2-16
3.2/4.2-17
3.9/4.9-1
3.9/4.9-3
3.9/4.9-4

TABLE 3.2-2

INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Minimum Number of Operable or Tripped Instrument Channels[1]	Trip Function	Trip Level Setting	Remarks
4	Reactor low low water level	≥84 inches (+4 inches/-0 inch) above top of active fuel*	1. In conjunction with low-reactor pressure initiates core spray and LPCI. 2. In conjunction with high-drywell pressure 120-second time delay and low-pressure core cooling interlock initiates auto blowdown. 3. Initiates HPCI and RCIC. 4. Initiates starting of diesel generators.
4[4]	High-drywell pressure[2],[3]	≤2 psig	1. Initiates core spray, LPCI, HPCI, and SGTS. 2. In conjunction with low low water level, 120-second time delay, and low-pressure core cooling interlock initiates auto blowdown. 3. Initiates starting of diesel generators. 4. Initiates isolation of control room ventilation.
2	Reactor low pressure	300 psig≤p≤350 psig	1. Permissive for opening core spray and LPCI admission valves. 2. In conjunction with low low reactor water level initiates core spray and LPCI.
	Containment spray interlock		Prevents inadvertent operation of containment spray during accident conditions.
2[3]	2/3 core height	≥2/3 core height	
4[3]	containment high pressure	0.5 psig≤p≤1.5 psig	
2	Timer auto blowdown	≤120 seconds	In conjunction with low low reactor water level, high-drywell pressure, and low-pressure core cooling interlock initiates auto blowdown.
4	Low-pressure core cooling pump discharge pressure	100 psig≤p≤150 psig	Defers APR actuation pending confirmation of low-pressure core cooling system operation.
2/BUS[5]	Undervoltage on emergency buses	3045 ± 5% volts	1. Initiates starting of diesel generators. 2. Permissive for starting ECCS pumps. 3. Removes nonessential loads from buses. 4. Bypasses degraded voltage timer.

*Top of active fuel is defined as 360" above vessel zero for all water levels used in the LOCA analysis.

TABLE 3.2-2 (Cont'd)

Minimum Number of Operable or Tripped Instrument Channels (1)	Trip Function	Trip Level Setting	Remarks
2(5)/Bus	Degraded Voltage on 4 KV Emergency Buses	3840 volts ± 2% with 5 ± 5% minute time delay and 7 ± 20% second inherent time delay	Initiates alarm and picks up time delay relay. Diesel Generator picks up load if degraded voltage not corrected after time delay.

NOTES

1. For all positions of the reactor mode selector switch (except for the containment interlock) whenever any ECCS subsystem is required to be operable, there shall be two operable trip systems. If the first column cannot be met for one or both of the trip systems, the systems actuated shall be declared inoperable and Specifications 3.5 or 3.9 shall govern.

2. Need not be operable when primary containment integrity is not required.

3. If an instrument is inoperable, it shall be placed (or simulated) in the tripped condition so that it will not prevent containment spray.

4. There are a total of eight high drywell pressure sensors. Four are used for core spray and LPCI initiation, and four are used for HPCI and auto blowdown initiation. This specification applies to each set of four sensors.

5. With the number of operable channels one less than the total number of channels, operation may proceed until performance of the next required functional test, provided the inoperable channel is placed in the tripped condition within one hour.

TABLE 4.2-1

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CORE AND CONTAINMENT COOLING SYSTEMS INSTRUMENTATION, ROD BLOCKS, AND ISOLATIONS[7]

Instrument Channel	Instrument Functional Test[2]	Calibration[2]	Instrument Check[2]
ECCS Instrumentation			
1. Reactor low-low water level	(1)	Once/3 months	Once/day
2. Drywell high pressure	(1)	Once/3 months	None
3. Reactor low pressure	(1)	Once/3 months	None
4. Containment spray interlock			
a. 2/3 core height	(1)	Once/3 months	None
b. Containment pressure	(1)	Once/3 months	None
5. Low-pressure core cooling pump discharge	(1)	Once/3 months	None
6. Undervoltage 4-kV essential	Refueling outage	Refueling outage	Once/3 months
7. Degraded voltage 4kv essential buses	Refueling[8] outage	Refueling Outage	Once/month
Rod Block			
1. APRM downscale	(1) (3)	Once/3 months	None
2. APRM flow variable	(1) (3)	Refueling outage	None
3. IRM upscale	(5) (3)	(5) (3)	None
4. IRM downscale	(5) (3)	(5) (3)	None
5. RBM upscale	(1) (3)	Refueling outage	None
6. RBM downscale	(1) (3)	Once/3 months	None
7. SRM upscale	(5) (3),	(5) (3)	None
8. SRM detector not in startup position	(5) (3)	(6)	None
9. IRM detector not in startup position	(5)	(6)	None
10. SRM downscale	(5) (3)	(5) (3)	None
11. High water level in scram discharge volume	Refueling outage	Not applicable	None
Main Steamline Isolation			
1. Steam tunnel high temperature	Refueling outage	Refueling outage	None
2. Steamline high flow	(1)	Once/3 months	Once/day
3. Steamline low pressure	(1)	Once/3 months	None
4. Steamline high radiation	(1) (4)	Refueling outage	Once/day
5. Reactor low low water level	(1)	Once/3 months	Once/day
RCIC Isolation			
1. Steamline high flow	Once/3 months	Once/3 months	None
2. Turbine area high temperature	Refueling outage	Refueling outage	None
3. Low reactor pressure	Once/3 months	Once/3 months	None

TABLE 4.2-1 (Cont'd)

Instrument Channel	Instrument Functional Test[2]	Calibration[2]	Instrument Check[2]
HPCI Isolation			
1. Steamline high flow	(1)	Once/3 months	None
2. Steamline area high temperature	Refueling outage	Refueling outage	None
3. Low reactor pressure	(1)	Once/3 months	None
Reactor Building Ventilation System Isolation And Standby Treatment System Initiation			
1. Ventilation exhaust duct radiation monitors	(1)	Once/3 months	Once/day
2. Refueling floor radiation monitors	(1)	Once/3 months	Once/day
Steam Jet Air Ejector Off-Gas Isolation			
1. Off-gas radiation monitors	(1) (4)	Refueling outage	Once/day
Control Room Ventilation System Isolation			
1. Reactor low water level	(1)	Once/3 months	Once/day
2. Drywell high pressure	(1)	Once/3 months	None
3. Main steamline high flow	(1)	Once/3 months	Once/day
4. Ventilation exhaust duct radiation monitors	(1)	Once/3 months	Once/day

Notes

1. Initially once per month until exposure hours (M as defined on Figure 4.1-1) are 2.0×10^5; thereafter, according to Figure 4.1-1 with an interval not less than 1 month nor more than 3 months. The compilation of instrument failure rate data may include data obtained from other boiling water reactors for which the same design instrument operates in an environment similar to that of Quad-Cities Units 1 and 2.
2. Functional tests, calibrations, and instrument checks are not required when these instruments are not required to be operable or are tripped.
3. This instrumentation is excepted from the functional test definition. The functional test shall consist of injecting a simulated electrical signal into the measurement channel.
4. This instrument channel is excepted from the functional test definitions and shall be calibrated using simulated electrical signals once every 3 months.
5. Functional tests shall be performed before each startup with a required frequency not to exceed once per week. Calibrations shall be performed during each startup or during controlled shutdowns with a required frequency not to exceed once per week.
6. The positioning mechanism shall be calibrated every refueling outage.
7. Logic system functional tests are performed as specified in the applicable section for these systems
8. Functional test shall include verification of operation of the degraded voltage 5-minute timer and 7-second inherent timer.

Amendment No. 91

3.9/4.9 AUXILIARY ELECTRICAL SYSTEMS

LIMITING CONDITIONS FOR OPERATION

Applicability:

Applies to the auxiliary electrical power system.

Objective:

To assure an adequate supply of electrical power during plant operation.

SURVEILLANCE REQUIREMENTS

Applicability:

Applies to the periodic testing requirement of the auxiliary electrical system.

Objective:

To verify the operability of the auxiliary electrical system.

SPECIFICATIONS

A. **Normal and Emergency A-C Auxiliary Power**

The reactor shall not be made critical unless all the following requirements are satisfied.

1. The Unit diesel generator and the Unit 1/2 diesel generator shall be operable.

A. **Normal and Emergency A-C Auxiliary Power**

1. a. Each diesel generator shall be manually started and loaded once each month to demonstrate operational readiness. The test shall continue until both the diesel engine and the generator are at equilibrium conditions of temperature while full load output is maintained.

   b. During the monthly generator test, the diesel-starting air compressor shall be checked for operation and its ability to recharge air receivers.

   c. During the monthly generator test, the diesel fuel oil transfer pumps shall be operated.

2. One 345-kV line, associated switchgear, and the reserve auxiliary power transformer capable of carrying power

2. The status of the 345-kV lines, associated switchgear, and the reserve auxiliary power transformer shall be

unless an additional line is sooner placed in service, providing both the Unit and Unit 1/2 emergency diesel generators are operable.

2. From and after the date the incoming power is not available from any line, continued reactor operation is permissible providing both the Unit and Unit 1/2 emergency diesel generators are operating, all core and containment cooling systems are operable, reactor power level is reduced to 40% of rated, and the NRC is notified within 24 hours of the situation, the precautions to be taken during this period, and the plans for prompt restoration of incoming power.

3. From and after the date that one of the two 125/250-volt battery systems is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 3 days unless such battery system is sooner made operable.

D. Diesel Fuel

There shall be a minimum of 10,000 gallons of diesel fuel supply on site for each diesel generator.

E. Diesel-Generator Operability

1. Whenever the reactor is in the Startup/Hot Standby or Run mode and the unit or shared diesel generators and/or their respective associated buses are made or found to be inoperable for any reason, except as specified in Specification 3.9.E.2 below, continued reactor operation is permissible only during the succeeding 7 days provided that all of the low-pressure core cooling and all loops of the containment cooling mode of the RHR system associated with the operable diesel generator shall be operable, and two offsite lines are available. If this requirement cannot be met, an orderly shutdown shall be initiated and the

D. Diesel Fuel

Once a month the quantity of diesel fuel available shall be logged.

Once a month a sample of diesel fuel shall be checked for quality.

E. Diesel-Generator Operability

1. When it is determined that either the unit or shared diesel generator is inoperable, all low-pressure core cooling systems and all loops of the containment cooling modes of the RHR system associated with the operable diesel generator shall be demonstrated to be operable immediately and daily thereafter. The operable diesel generator shall be demonstrated to be operable immediately and daily thereafter.

2. During each refueling outage, a simulated loss of off-site power in conjunction with an ECCS initiation signal test shall be performed on the 4160 volt emergency bus by:

Amendment No. 92, 71

reactor shall be in the cold shutdown condition within 24 hours.

2. Specification 3.9.E.1 shall not apply when a diesel generator has been made inoperable for a period not to exceed 1-1/2 hours for the purpose of conducting preventative maintenance. Additionally, preventative maintenance shall not be undertaken unless two off site lines are available and the alternate diesel generator has been demonstrated to be operable.

3. Whenever the reactor is in the Cold Shutdown or Refueling mode, a minimum of one diesel generator (either the Unit diesel generator or the Unit 1/2 diesel generator) shall be operable whenever any work is being done which has the potential for draining the vessel, secondary containment is required, or a core or containment cooling system is required.

a. Verifying de-energization of the emergency buses, and load shedding from the emergency buses.

b. Verifying the diesel starts from ambient condition on the auto-start signal, energizes the emergency buses with permanently connected loads, energizes the auto-connected emergency loads through the load sequencer, and operates for greater than 5 minutes while its generator is loaded with the emergency loads.

Amendment No. 171

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 72 TO PROVISIONAL OPERATING LICENSE NO. DPR-19,

AMENDMENT NO. 64 TO FACILITY OPERATING LICENSE NO. DPR-25,

AMENDMENT NO. 77 TO FACILITY OPERATING LICENSE NO. DPR-29, AND

AMENDMENT NO. 71 TO FACILITY OPERATING LICENSE NO. DPR-30

COMMONWEALTH EDISON COMPANY AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DRESDEN STATION UNIT NO. 2

DRESDEN STATION UNIT NO. 3

QUAD CITIES STATION UNIT NO. 1

QUAD CITIES STATION UNIT NO. 2

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

1.0 INTRODUCTION

The criteria and staff positions pertaining to degraded grid voltage protection were transmitted to Commonwealth Edison (CE) by NRC Generic Letter dated June 3, 1977. In response to this, by letters dated July 27, 1977, June 26, 1980, October 1, 1980, October 28, 1981, January 6, 1982 and March 4, 1982, the licensee proposed certain design modifications and changes to the Technical Specifications. A detailed review and technical evaluation of these proposed modifications and changes to the technical specifications were performed by EG&G, under contract to the NRC, and with general supervision by NRC staff. This work is reported by EG&G in "Degraded Grid Protection for Class 1E Power Systems Dresden Station, Unit Nos. 2 and 3," dated March 1982, and "Degraded Grid Protection for Class 1E Power Systems Quad Cities Station Unit Nos. 1 and 2," dated March 1982, (Attachments 1 and 2 to this Safety Evaluation). We have reviewed these Technical Evaluation Reports (TER) and concur in the conclusion that the proposed electrical design modifications and technical specification changes are acceptable.

2.0 BACKGROUND

The criteria used by EG&G in its technical evaluation of the proposed changes include GDC-17 ("Electric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 279-1971 ("Criteria for Protection Systems for Nuclear Power Generating Stations"); IEEE Standard 308-1977 ("Voltage Ratings for Electrical Power Systems and Equipment - 60 Hz"); and staff positions defined in NRC Generic Letter to CE dated June 3, 1977.

3.0 PROPOSED CHANGES, MODIFICATIONS AND DISCUSSION

The following electrical system design modifications and technical specifications changes were proposed by CE.

1. Installation of a second level of undervoltage protection on each 4160 volt Class IE bus. This protective relaying will consist of relays connected in a two-out-of-two logic (per bus) such that when the 4160 volt Class 1E bus voltage falls below setpoint, (3784V maximum 3708V minimum) for longer than 7 ($\pm$ 1.4) seconds it will deenergize the second level undervoltage relays and activate a series connected timer (setpoint 5 minutes). At the end of five minutes, the offsite power source breakers will be tripped, the diesel generator is started, load shedding will be initiated, and the Class 1E loads will be sequenced on the emergency diesel generator when satisfactory voltage and frequency is achieved. If a safety injection signal (SIS) is generated by the reactor protection system concurrent with the degraded voltage condition or at any time during the operation of the five minute timer, the SIS will automatically start the onsite emergency diesel generators and bypass the five minute timer. The five-minute time delay is of sufficient duration to prevent spurious operation of the second level loss of voltage relays during short bus voltage disturbances that may result from starting of large motors or short term grid disturbances. Additionally, this time delay will allow operator action to attempt restoration of grid voltage by means available to him.

2. Modify the load shedding circuitry such that once the diesel generator is supplying its associated bus, load shedding is blocked by a "b" contact of the diesel generator breaker. If the onsite emergency diesel generator breaker should be tripped, load shedding and load sequencing will be reinstated.

3. Additions and changes to the plant technical specifications including the surveillance requirements, allowable limits for the relay setpoint and time delay ahve been provided by the licensee. An analysis to substantiate the limiting conditions for operation and minimum and maximum setpoint limits were included as part of the modification proposed. The changes and additions to technical specifications have been reviewed and found acceptable.

4.0 EVALUATION AND SUMMARY

We have reviewed the EG&G Technical Evaluation Report and concur in its findings that:

1. The proposed degraded grid modifications will protect the Class 1E equipment and systems from sustained degraded voltage of the offsite power system.

2. The proposed technical specification changes and additions are acceptable.

3. Spurious operation of the second level degraded grid voltage relays will not occur during the starting of large motors.

We, therefore, find the Dresden Station, Units 2 and 3 and the Quad Cities Station, Units 1 and 2 design to be acceptable with respect to degraded grid voltage protection for the Class 1E system.

5.0 ENVIRONMENTAL CONSIDERATIONS

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these amendments.

6.0 CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Attachments 1 and 2:
TER's for Dresden 2 and 3;
Quad Cities 1 and 2

Date: May 19, 1982

ATTACHMENT 1

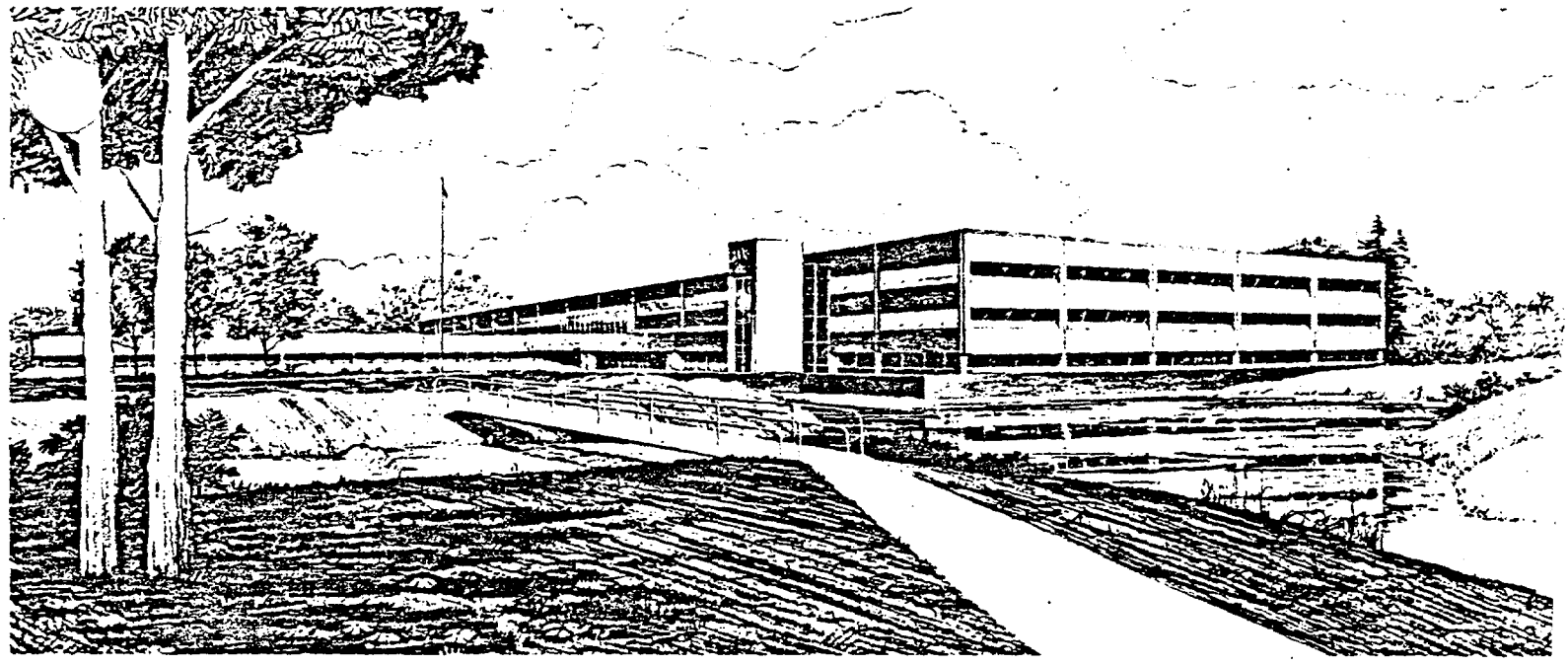
EGG-EA-5811

March 1982

DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS, DRESDEN STATION, UNIT NOS. 2 AND 3

A. C. Udy

U.S. Department of Energy
Idaho Operations Office • Idaho National Engineering Laboratory



Prepared for the
U. S. Nuclear Regulatory Commission
Under DOE Contract No. DE-AC07-76ID01570
FIN No. A6429

EG&G Idaho

EG&G Idaho, Inc.

FORM EG&G-398
(Rev. 03-82)

INTERIM REPORT

Accession No. _____

Report No. EGG-EA-5811

Contract Program or Project Title:
Selected Operating Reactors Issues Program (III)

Subject of this Document:
Degraded Grid Protection for Class 1E Power Systems, Dresden Station, Unit Nos. 2 and 3

Type of Document:
Informal Report

Author(s):

A. C. Udy

Date of Document:

March 1982

Responsible NRC Individual and NRC Office or Division:

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Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C.
Under DOE Contract No. DE-AC07-76ID01570
NRC FIN No. A6429

INTERIM REPORT

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DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS

DRESDEN STATION, UNIT NOS. 2 AND 3

Docket No. 50-237 and 50-249

March 1982

A. C. Udy
Reliability and Statistics Branch
Engineering Analysis Division
EG&G Idaho, Inc.

TAC Nos. 10019
and 10021

ABSTRACT

This EG&G Idaho, Inc. report reviews the susceptibility of the safety-related electrical equipment, at the Dresden Station, to a sustained degradation of the offsite power sources.

FOREWORD

This report is supplied as part of the "Selected Operating Reactor Issues Program (III)" being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by EG&G Idaho, Inc., Reliability and Statistics Branch.

The U.S. Nuclear Regulatory Commission funded the work under Authorization B&R 20-19-01-06.

CONTENTS

DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS

DRESDEN STATION, UNIT NOS. 2 AND 3

1.0 INTRODUCTION

On June 3, 1977, the NRC requested Commonwealth Edison (CE) to assess the susceptibility of the safety-related electrical equipment at the Dresden Station to a sustained voltage degradation of the offsite source and interaction of the offsite and onsite emergency power systems.[1] The letter contained three positions with which the current design of the plant was to be compared. After comparing the current design to the staff positions, CE was required to either propose modifications to satisfy the positions and criteria or furnish an analysis to substantiate that the existing facility design has equivalent capabilities.

CE responded to the NRC letter on July 27, 1977.[2] CE proposed design modifications on June 26, 1980[3] and provided additional details on the modifications on October 1, 1980.[4] Draft technical specifications were submitted on October 28, 1981.[5] These were modified by a submittal of January 6, 1982,[6] and replaced with a submittal of March 4, 1982.[7]

2.0 DESIGN BASE CRITERIA

The design base criteria that were applied in determining the acceptablility of the system modifications to protect the safety-related equipment from a sustained degradation of the offsite grid voltage are:

1. General Design Criterion 17 (GDC 17), "Electrical Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.[8]

2. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."[9]

3. IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations."[10]

4. Staff positions as detailed in a letter sent to the licensee, dated June 3, 1977.[1]

5. ANSI Standard C84.1-1977, "Voltage Ratings for Electrical Power Systems and Equipment (60 HZ)."[11]

3.0 EVALUATION

This section provides, in Subsection 3.1, a brief description of the existing undervoltage protection at the Dresden Station; in Subsection 3.2, a description of the licensee's proposed scheme for the second-level undervoltage protection; and, in Subsection 3.3, a discussion of how the system meets the design base criteria.

3.1 Existing Undervoltage Protection. The present design utilizes two undervoltage relays on each 4160V Class 1E bus. They are arranged in a two-out-of-two logic scheme that senses complete loss of voltage. The relays and their logic circuitry start the diesel generator, initiate load-shedding, and trip the incoming line breaker.

The existing logic circuitry of the undervoltage protection system does not disable the load-shed feature once the diesel generators are supplying power to the Class 1E buses.

3.2 Modifications. To protect the Class 1E safety-related equipment from the effects of a degraded grid condition, the licensee has proposed adding another set of undervoltage relays to each of the 4160V Class 1E buses. Each set will be comprised of two solid-state undervoltage relays that have an inherent time delay of seven seconds, arranged in a two-out-of-two logic scheme, with associated auxiliary relays and a timer added to the undervoltage logic circuitry. The setpoint of the second-level protection relays will be between 3708V and 3784V, with a time delay of 5 minutes. Should the two undervoltage relays remain tripped for 5 minutes, or if a LOCA signal occurs during that 5 minute period, the diesel is started, and the undervoltage condition is annunciated in the control room, the incoming line breakers are tripped, load-shedding is initiated, and finally the diesel generator breaker is closed when the voltage and the frequency from the diesel generator are satisfactory. The loss-of-voltage relays function as before, with a setpoint between the limits of 3092V and 3255V.

Once the diesel generator is supplying its associated Class 1E bus, load-shedding is blocked by the "b" contact of the diesel generator breaker.

Proposed changes to the station's technical specifications, adding the surveillance requirements, allowable limits for the setpoint and time delay, and limiting conditions for operation for the second-level undervoltage monitors, were furnished by the licensee.[7]

3.3 Discussion. The first position of the NRC staff letter[1] required that a second level of undervoltage protection for the onsite power system be provided. The letter stipulates other criteria that the undervoltage protection must meet. Each criterion is restated below followed by a discussion regarding the licensee's compliance with that criterion.

1. "The selection of voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels."

   The licensee's proposed nominal setpoint of 3746V at the 4160V bus is 93.6% of the motor nominal voltage rating of 4kV. This voltage setpoint was chosen after a system voltage analysis was completed.[12] The time delay allows operator action to improve the voltage levels. The time delay is defeated immediately should a LOCA signal occur.

2. "The voltage protection shall include coincidence logic to preclude spurious trips of the offsite power sources."

The relay logic is arranged in a two-out-of-two logic scheme, thereby satisfying this criterion.

3. "The time delay selected shall be based on the following conditions:

   a. "The allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analysis."

      There is no induced time delay for undervoltage protection should an accident signal be present. The Class 1E bus will be ready for transfer to diesel-generator power before the diesel is up to speed.

   b. "The time delay shall minimize the effect of short-duration disturbances from reducing the unavailability of the offsite power source(s)."

      The licensee's proposed minimum time delay of 5.6 seconds is long enough to override any short inconsequential grid disturbances.

   c. "The allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety systems or components."

      A review of the licensee's voltage analysis[12] indicates that the time delay will not cause any failures of the safety-related equipment since the nominal voltage setpoint is within the allowable tolerance of the equipment voltage rating.

4. "The voltage monitors shall automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time-delay limits have been exceeded."

   A review of the licensee's proposal substantiates that this criterion is met.

5. "The voltage monitors shall be designed to satisfy the requirements of IEEE Standard 279-1971."

   The licensee has stated that the circuits associated with the undervoltage relays meet the applicable requirements of IEEE Standard 279-1971.

6. "The Technical Specifications shall include limiting conditions for operations, surveillance requirements, trip setpoints with minimum and maximum limits, and allowable values for the second-level voltage protection monitors."

The licensee's proposal for technical specification changes includes the required items. The voltage setpoint, with the maximum allowable limit included, is 3784V. The lowest bus voltage available to the undervoltage relays, as determined by CE, is 3784V (Unit 2) and 3856V (Unit 3).[12] Therefore, spurious trips of the offsite source due to operation of the undervoltage relays is not possible with the most limiting tolerance. The limiting conditions for operation, the surveillance requirements, the channel test frequency and the calibration frequency are included in the technical specifications, and while not in conformance with the model technical specifications, do meet the criteria of the staff's positions.

The second NRC staff position requires that the system design automatically prevent load-shedding of the emergency buses once the onsite sources are supplying power to all sequenced loads. The load-shedding must also be reinstated if the onsite breakers are tripped.

The licensee has modified the Dresden Station to incorporate this feature in the circuit design at Units 2 and 3. The load-shed is blocked by an auxiliary contact of the diesel generator circuit breaker.

The third NRC staff position requires that certain test requirements be added to the technical specifications. These tests were to demonstrate the full-functional operability and independence of the onsite power sources and are to be performed at least once per 18 months during shutdown. The tests are to simulate loss of offsite power in conjunction with a simulated safety injection actuation signal and to simulate interruption and subsequent reconnection of onsite power sources. These tests verify the proper operation of the load-shed system, the load-shed bypass when the emergency diesel generators are supplying power to their respective buses, and that there is no adverse interaction between the onsite and offsite power sources.

The testing procedures proposed by the licensee comply with most of this position. Load-shedding on the trip of offsite power is tested. Load-sequencing, once the diesel generator is supplying the safety buses, is tested. A simulated loss of the diesel generator and subsequent load-shedding and load-sequencing once the diesel generator is back on-line is not tested. A loss of the diesel generator prohibits automatic restarting. The load sequencer is controlled by a contact of the diesel-generator breaker, and therefore, by design, tripping of the diesel generator breaker will reset the load shedding and the load sequencing circuitry. The time duration of the test will verify that there is no interaction between the offsite and the onsite power sources and that the load-shed bypass circuit is functioning properly.

4.0 CONCLUSIONS

Based on the information provided by CE, it has been determined that the proposed changes do comply with NRC staff position 1. All of the staff's requirements and design base criteria have been met. The setpoint

and time delay will protect the Class 1E equipment from a sustained degraded voltage condition of the offsite power source.

The load-shed circuitry has been modified to comply with staff position 2 and it will prevent adverse interaction of the offsite and onsite emergency power systems.

The changes to the technical specifications adequately test the system modifications and comply with staff position 3. The surveillance requirements, limiting conditions for operation, minimum and maximum limits for the trip point, and allowable values satisfy staff position 1.

Therefore, CE's proposed changes and technical specification changes are acceptable. It is recommended that the proposed technical specification changes be approved and implemented to coincide with completion of the modifications.

5.0 REFERENCES

1. NRC letter to R. L. Bolger, CE, June 3, 1977.

2. CE letter, R. L. Bolger to K. R. Goller, NRC, "Onsite Emergency Power Systems," July 22, 1977.

3. CE letter, R. F. Janecek to D. G. Eisenhut, NRC, "Second Level of Undervoltage Protection for 4KV Onsite Emergency Power Systems," June 26, 1980.

4. CE letter, R. F. Janecek to T. M. Novak, NRC, "Response to Request for Information Concerning Undervoltage Protection," October 1, 1980.

5. CE letter, T. J. Rausch to D. G. Eisenhut, NRC, "Draft Technical Specifications Concerning Undervoltage Protection," October 28, 1981.

6. CE letter, T. J. Rausch to P. O'Conner, NRC, "Draft Technical Specification Concerning Undervoltage Protection," January 6, 1982.

7. CE letter, T. J. Rausch to H. R. Denton, NRC, "Proposed Technical Specification Changes to Implement Second-level Undervoltage Relays," March 4, 1982.

8. General Design Criterion 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

9. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."

10. IEEE Standard 308-1974, "Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

11. ANSI C84.1-1977, "Voltage Ratings for Electric Power Systems and Equipment (60 HZ)."

12. "Adequacy of Station Electric Distribution System Voltages, Dresden Station, Unit Nos. 2 and 3," EG&G Idaho, Inc. Informal Report EGG-EA-5322, A. Udy, August 1981.

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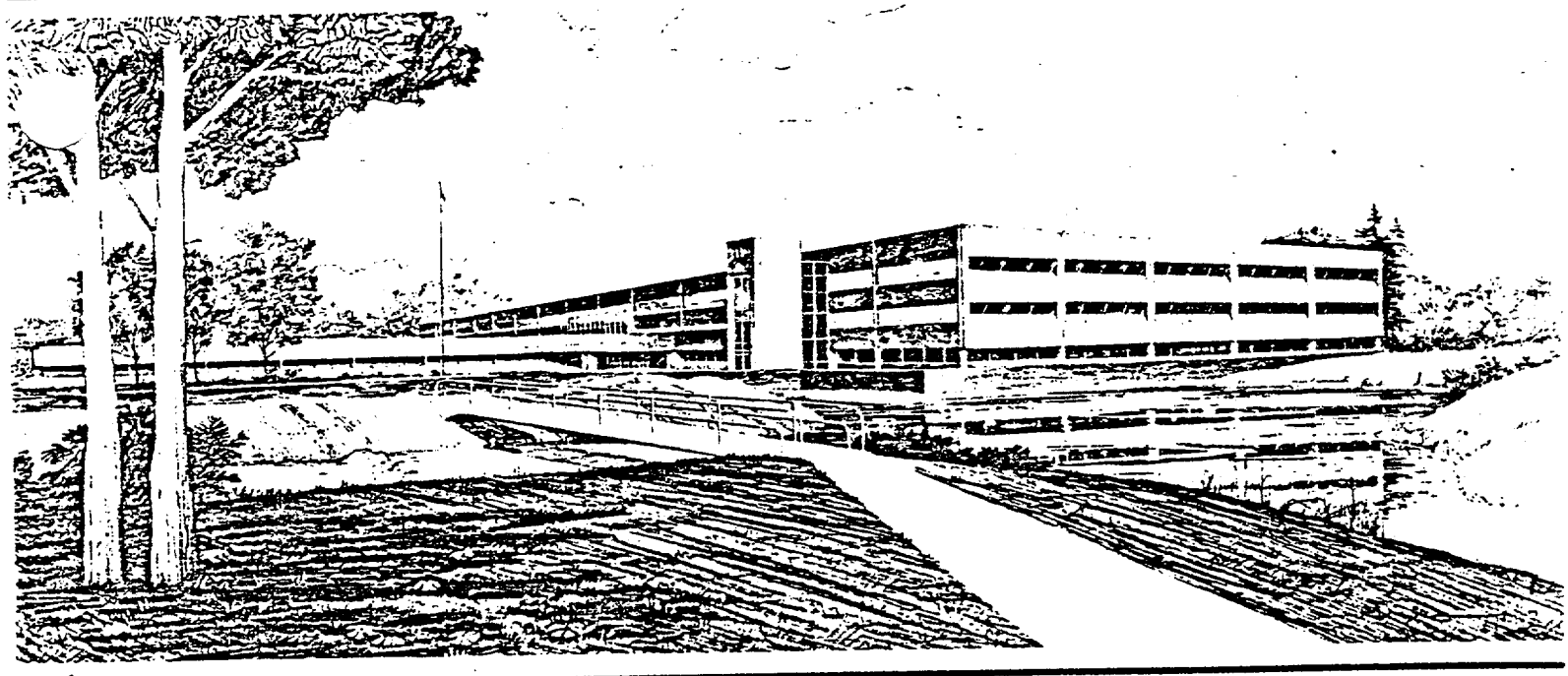
EGG-EA-5810

March 1982

DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS, QUAD CITIES STATION, UNIT NOS. 1 AND 2

A. C. Udy

U.S. Department of Energy
Idaho Operations Office • Idaho National Engineering Laboratory



This is an informal report intended for use as a preliminary or working document

Prepared for the
U.S. Nuclear Regulatory Commission
Under DOE Contract No. DE-AC07-76ID01570
FIN No. A6429

EG&G Idaho

EG&G Idaho, Inc.

FORM EG&G-398
(Rev.03-82)

INTERIM REPORT

Accession No. _____

Report No. EGG-EA-5810

Contract Program or Project Title:
Selected Operating Reactors Issues Program (III)

Subject of this Document:
Degraded Grid Protection for Class 1E Power Systems, Quad Cities Station, Unit Nos. 1 and 2

Type of Document:
Informal Report

Author(s):

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Date of Document:

March 1982

Responsible NRC Individual and NRC Office or Division:

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Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C.
Under DOE Contract No. DE-AC07-76ID01570
NRC FIN No. A6429

INTERIM REPORT

0027j

DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS

QUAD CITIES STATION, UNIT NOS. 1 AND 2

Docket No. 50-254 and 50-265

March 1982

A. C. Udy
Reliability and Statistics Branch
Engineering Analysis Division
EG&G Idaho, Inc.

TAC Nos. 10047
and 10046

ABSTRACT

This EG&G Idaho, Inc. report reviews the susceptibility of the safety-related electrical equipment, at the Quad Cities Station, to a sustained degradation of the offsite power sources.

FOREWORD

This report is supplied as part of the "Selected Operating Reactor Issues Program (III)" being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by EG&G Idaho, Inc., Reliability and Statistics Branch.

The U.S. Nuclear Regulatory Commission funded the work under Authorization B&R 20-19-01-06.

CONTENTS

DEGRADED GRID PROTECTION FOR CLASS 1E POWER SYSTEMS

QUAD CITIES STATION, UNIT NOS. 1 AND 2

1.0 INTRODUCTION

On June 3, 1977, the NRC requested Commonwealth Edison (CE) to assess the susceptibility of the safety-related electrical equipment at the Quad Cities Station to a sustained voltage degradation of the offsite source and interaction of the offsite and onsite emergency power systems.[1] The letter contained three positions with which the current design of the plant was to be compared. After comparing the current design to the staff positions, CE was required to either propose modifications to satisfy the positions and criteria or furnish an analysis to substantiate that the existing facility design has equivalent capabilities.

CE responded to the NRC letter on July 27, 1977.[2] CE proposed design modifications on June 26, 1980[3] and provided additional details on the modifications on October 1, 1980.[4] Draft technical specifications were submitted on October 28, 1981.[5] These were modified by a submittal of January 6, 1982,[6] and replaced by a submittal of March 4, 1982.[7]

2.0 DESIGN BASE CRITERIA

The design base criteria that were applied in determining the acceptablility of the system modifications to protect the safety-related equipment from a sustained degradation of the offsite grid voltage are:

1. General Design Criterion 17 (GDC 17), "Electrical Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50.[8]

2. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."[9]

3. IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations."[10]

4. Staff positions as detailed in a letter sent to the licensee, dated June 3, 1977.[1]

5. ANSI Standard C84.1-1977, "Voltage Ratings for Electrical Power Systems and Equipment (60 HZ)."[11]

3.0 EVALUATION

This section provides, in Subsection 3.1, a brief description of the existing undervoltage protection at the Quad Cities Station; in Subsection 3.2, a description of the licensee's proposed scheme for the second-level undervoltage protection; and, in Subsection 3.3, a discussion of how the system meets the design base criteria.

3.1 Existing Undervoltage Protection. The present design utilizes two undervoltage relays on each 4160V Class 1E bus. They are arranged in a two-out-of-two logic scheme that senses complete loss of voltage. The relays and their logic circuitry start the diesel generator, initiate load-shedding, and trip the incoming line breaker.

The existing logic circuitry of the undervoltage protection system does not disable the load-shed feature once the diesel generators are supplying power to the Class 1E buses.

3.2 Modifications. To protect the Class 1E safety-related equipment from the effects of a degraded grid condition, the licensee has proposed adding another set of undervoltage relays to each of the 4160V Class 1E buses. Each set will be comprised of two solid-state undervoltage relays that have an inherent time delay of seven seconds, arranged in a two-out-of-two logic scheme, with associated auxiliary relays and a timer added to the undervoltage logic circuitry. The setpoint of the second-level protection relays will be 3840V $\pm$ 2% with a time delay of 5 minutes. Should the two undervoltage relays remain tripped for 5 minutes, or if a LOCA signal occurs during that 5 minute period, the diesel is started, and the undervoltage condition is annunciated in the control room, the incoming line breakers are tripped, load-shedding is initiated, and finally the diesel generator breaker is closed when the voltage and the frequency from the diesel generator are satisfactory. The loss-of-voltage relays function as before, with a setpoint of 3045V $\pm$ 5%.

Once the diesel generator is supplying its associated Class 1E bus, load-shedding is blocked by the "b" contact of the diesel generator breaker.

Proposed changes to the station's technical specifications, adding the surveillance requirements, allowable limits for the setpoint and time delay, and limiting conditions for operation for the second-level undervoltage monitors, were furnished by the licensee.[7]

3.3 Discussion. The first position of the NRC staff letter[1] required that a second level of undervoltage protection for the onsite power system be provided. The letter stipulates other criteria that the undervoltage protection must meet. Each criterion is restated below followed by a discussion regarding the licensee's compliance with that criterion.

1. "The selection of voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels."

   The licensee's proposed setpoint of 3840V at the 4160V bus is 96.0% of the motor nominal voltage rating of 4kV. This voltage setpoint was chosen after a system voltage analysis was completed.[12] The time delay allows operator action to improve the voltage levels. The time delay is defeated immediately should a LOCA signal occur.

2. "The voltage protection shall include coincidence logic to preclude spurious trips of the offsite power sources."

The relay logic is arranged in a two-out-of-two logic scheme, thereby satisfying this criterion.

3. "The time delay selected shall be based on the following conditions:

   a. "The allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analysis."

      There is no induced time delay for undervoltage protection should an accident signal be present. The Class 1E bus will be ready for transfer to diesel-generator power before the diesel is up to speed.

   b. "The time delay shall minimize the effect of short-duration disturbances from reducing the unavailability of the offsite power source(s)."

      The licensee's proposed minimum time delay of 5.6 seconds is long enough to override any short inconsequential grid disturbances.

   c. "The allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety systems or components."

      A review of the licensee's voltage analysis[12] indicates that the time delay will not cause any failures of the safety-related equipment since the nominal voltage setpoint is within the allowable tolerance of the equipment voltage rating.

4. "The voltage monitors shall automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time-delay limits have been exceeded."

   A review of the licensee's proposal substantiates that this criterion is met.

5. "The voltage monitors shall be designed to satisfy the requirements of IEEE Standard 279-1971."

   The licensee has stated that the circuits associated with the undervoltage relays meet the applicable requirements of IEEE Standard 279-1971.

6. "The Technical Specifications shall include limiting conditions for operations, surveillance requirements, trip setpoints with minimum and maximum limits, and allowable values for the second-level voltage protection monitors."

The licensee's proposal for technical specification changes includes all the required items. The voltage setpoint, with the maximum allowable limit included, is 3917V. A high setpoint is needed to assure adequate voltages to all Class 1E equipment. The lowest bus voltage available to the undervoltage relays, as determined by CE, is 3840V.[12] Therefore, if both undervoltage relay setpoints drifted to the upper limit, spurious trips of the offsite source due to operation of the undervoltage relays could occur. It is unlikely that both setpoints would drift to the upper limit concurrently. Therefore, the proposed setpoint and tolerences are acceptable. The limiting conditions for operation, the surveillance requirements, the channel test frequency and the calibration frequency are included in the technical specifications, and while not in conformance with the model technical specifications, do meet the criteria of the staff's positions.

The second NRC staff position requires that the system design automatically prevent load-shedding of the emergency buses once the onsite sources are supplying power to all sequenced loads. The load-shedding must also be reinstated if the onsite breakers are tripped.

The licensee has modified the Quad Cities Station to incorporate this feature in the circuit design. The load-shed is blocked by an auxiliary contact of the diesel generator circuit breaker.

The third NRC staff position requires that certain test requirements be added to the technical specifications. These tests were to demonstrate the full-functional operability and independence of the onsite power sources and are to be performed at least once per 18 months during shutdown. The tests are to simulate loss of offsite power in conjunction with a simulated safety injection actuation signal and to simulate interruption and subsequent reconnection of onsite power sources. These tests verify the proper operation of the load-shed system, the load-shed bypass when the emergency diesel generators are supplying power to their respective buses, and that there is no adverse interaction between the onsite and offsite power sources.

The testing procedures proposed by the licensee comply with most of this position. Load-shedding on the trip of offsite power is tested. Load-sequencing, once the diesel generator is supplying the safety buses, is tested. A simulated loss of the diesel generator and subsequent load-shedding and load-sequencing once the diesel generator is back on-line is not tested. A loss of the diesel generator prohibits automatic restarting. The load sequencer is controlled by a contact of the diesel generator breaker, and therefore, by design, tripping of the diesel generator breaker will reset the load shedding and the load sequencing circuitry. The time duration of the test will verify that there is no interaction between the offsite and the onsite power sources and that the load-shed bypass circuit is functioning properly.

4.0 CONCLUSIONS

Based on the information provided by CE, it has been determined that the proposed changes do comply with NRC staff position 1. All of the staff's requirements and design base criteria have been met. The setpoint and time delay will protect the Class 1E equipment from a sustained degraded voltage condition of the offsite power source.

The load-shed circuitry has been modified to comply with staff position 2 and it will prevent adverse interaction of the offsite and onsite emergency power systems.

The changes to the technical specifications adequately test the system modifications and comply with staff position 3. The surveillance requirements, limiting conditions for operation, minimum and maximum limits for the trip point, and allowable values satisfy staff position 1.

Therefore, CE's proposed changes and technical specification changes are acceptable. It is recommended that the proposed technical specification changes be approved and implemented to coincide with the completion of the modifications.

5.0 REFERENCES

1. NRC letter to R. L. Bolger, CE, June 3, 1977.
2. CE letter, R. L. Bolger to K. R. Goller, NRC, "Onsite Emergency Power Systems," July 22, 1977.
3. CE letter, R. F. Janecek to D. G. Eisenhut, NRC, "Second Level of Undervoltage Protection for 4KV Onsite Emergency Power Systems," June 26, 1980.
4. CE letter, R. F. Janecek to T. M. Novak, NRC, "Response to Request for Information Concerning Undervoltage Protection," October 1, 1980.
5. CE letter, T. J. Rausch to D. G. Eisenhut, NRC, "Draft Technical Specifications Concerning Undervoltage Protection," October 28, 1981.
6. CE letter, T. J. Rausch to P. O'Conner, NRC, "Draft Technical Specification Concerning Undervoltage Protection," January 6, 1982.
7. CE letter, T. J. Rausch to H. R. Denton, NRC, "Proposed Technical Specification Changes to Implement Second-level Undervoltage Relays," March 4, 1982.
8. General Design Criterion 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."
9. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."

10. IEEE Standard 308-1974, "Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

11. ANSI C84.1-1977, "Voltage Ratings for Electric Power Systems and Equipment (60 HZ)."

12. "Adequacy of Station Electric Distribution System Voltages, Quad Cities Station, Unit Nos. 1 and 2," EG&G Idaho, Inc. Informal Report EGG-EA-5323, A. Udy, March 1981.

EG&G Idaho, Inc.

FORM EG&G-398
(Rev.03-82)

INTERIM REPORT

Accession No. _____

Report No. EGG-EA-5811

Contract Program or Project Title:
Selected Operating Reactors Issues Program (III)

Subject of this Document:
Degraded Grid Protection for Class 1E Power Systems, Dresden Station, Unit Nos. 2 and 3

Type of Document:
Informal Report

Author(s):

A. C. Udy

Date of Document:

March 1982

Responsible NRC Individual and NRC Office or Division:

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Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C.
Under DOE Contract No. DE-AC07-76ID01570
NRC FIN No. A6429

INTERIM REPORT

UNITED STATES NUCLEAR REGULATORY COMMISSION

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

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

NOTICE OF ISSUANCE OF AMENDMENTS TO OPERATING LICENSES

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 72 to Provisional Operating License No. DPR-19, and Amendment No. 64 to Facility Operating License No. DPR-25, issued to Commonwealth Edison Company, which revised the Technical Specifications for operation of the Dresden Nuclear Power Station Unit Nos. 2 and 3, located in Grundy County, Illinois. The Commission has also issued Amendment No. 77 to Facility Operating License No. DPR-29, and Amendment No. 71 to Facility Operating License No. DPR-30, issued to Commonwealth Edison Company and Iowa-Illinois Gas and Electric Company, which revised the Technical Specifications for operation of the Quad Cities Nuclear Power Station, Unit Nos. 1 and 2, located in Rock Island County, Illinois. The amendments are to become effective 30 days after installation and testing of the equipment.

The amendments approve changes to the provisions of the Appendix A Technical Specifications pertaining to under voltage protection.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations

in 10 CFR Chapter I, which are set forth in the license amendments. Prior public notice of these amendments was not required since the amendments do not involve a significant hazards consideration.

The Commission has determined that the issuance of these amendments will not result in any significant environmental impact and that pursuant to 10 CFR Section 51.5(d)(4) an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of these amendments.

For further details with respect to this action, see (1) the application for amendments dated March 4, 1982, and supporting submittals dated July 27, 1977, June 26, 1980, October 1, 1980, October 28, 1981 and January 6, 1982; (2) Amendment No. 72 to License No. DPR-19, Amendment No. 64 to License No. DPR-25, Amendment No. 77 to License No. DPR-29 and Amendment No. 71 to License No. DPR-30; and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D. C., and at the Morris Public Library, 604 Liberty Street, Morris, Illinois, for Dresden 2 and 3 and at the Moline Public Library, 504-17th Street, Moline, Illinois, for Quad Cities 1 and 2. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Licensing.

Dated at Bethesda, Maryland, this 19th day of May, 1982.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis M. Crutchfield

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing