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

METROPOLITAN EDISON COMPANY

JERSEY CENTRAL POWER AND LIGHT COMPANY

PENNSYLVANIA ELECTRIC COMPANY

GPU NUCLEAR CORPORATION

DOCKET NO. 50-289

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 98
License No. DPR-50

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

   A. The application for amendment by GPU Nuclear Corporation, et al (the licensees) dated March 28, 1984, as revised May 11, 1984, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.c.(2) of Facility Operating License No. DPR-50 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 98 , are hereby incorporated in the license. GPU Nuclear Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment becomes effective 45 days after its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz, Chief
Operating Reactors Branch No. 4
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 7, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 98

FACILITY OPERATING LICENSE NO. DPR-50

DOCKET NO. 50-289

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change.

Remove	Insert
ii	ii
1-1	1-1*
1-2	1-2
3-1	3-1
---	3-1a
3-19	3-19
3-21	3-21
3-22	3-22
3-23	3-23*
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3-43	3-43

*Overleaf page included for document completeness.

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1. DEFINITIONS

The following terms are defined for uniform interpretation of these specifications.

1.1 RATED POWER

Rated power is a steady state reactor core output of 2535 MWt.

1.2 REACTOR OPERATING CONDITIONS

1.2.1 COLD SHUTDOWN

The reactor is in the cold shutdown condition when it is subcritical by at least one percent $\Delta k/k$ and Tavg is no more than 200 F. Pressure is defined by Specification 3.1.2.

1.2.2 HOT SHUTDOWN

The reactor is in the hot shutdown condition when it is subcritical by at least one percent $\Delta k/k$ and Tavg is at or greater than 525 F.

1.2.3 REACTOR CRITICAL

The reactor is critical when the neutron chain reaction is self-sustaining and Keff = 1.0.

1.2.4 HOT STANDBY

The reactor is in the hot standby condition when all of the following conditions exist:

a. Tavg is greater than 525 F

b. The reactor is critical

c. Indicated neutron power on the power range channels is less than two percent of rated power

1.2.5 POWER OPERATION

The reactor is in a power operating condition when the indicated neutron power is above two percent of rated power as indicated on the power range channels.

1.2.6 REFUELING SHUTDOWN

The reactor is in the refueling shutdown condition when, even with all rods removed, the reactor would be subcritical by at least one percent $\Delta k/k$ and the coolant temperature at the decay heat removal pump suction is no more than

140F. Pressure is defined by Specification 3.1.2. A refueling shutdown refers to a shutdown to replace or rearrange all or a portion of the fuel assemblies and/or control rods.

1.2.7 REFUELING OPERATION

An operation involving a change in core geometry by manipulation of fuel or control rods when the reactor vessel head is removed.

1.2.8 REFUELING INTERVAL

Time between normal refuelings of the reactor, not to exceed 24 months without prior approval of the NRC.

1.2.9 STARTUP

The reactor shall be considered in the startup mode when the shutdown margin is reduced with the intent of going critical.

1.2.10 T_{AVG}

T_{AVG} is defined as the arithmetic average of the coolant temperatures in the hot and cold legs of the loop with the greater number of reactor coolant pumps operating if such a distinction of loops can be made.

1.2.11 HEATUP - COOLDOWN MODE

The heatup-cooldown mode is the range of reactor coolant temperature greater than 200°F and less than 525°F.

1.2.12 STATION, UNIT, PLANT AND FACILITY

Station, unit, plant, and facility as used in these technical specifications all refer to TMI Unit 1.

1.3 OPERABLE

A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s) and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

1.4 PROTECTION INSTRUMENTATION LOGIC

1.4.1 INSTRUMENT CHANNEL

An instrument channel is the combination of sensor, wires, amplifiers and output devices which are connected for the purpose of measuring the value of a process variable for the purpose of observation, control and/or protection. An instrument channel may be either analog or digital.

1.4.2 REACTOR PROTECTION SYSTEM

The reactor protection system is shown in Figures 7-1 and 7-6 of the FSAR. It is that combination of protection channels and associated circuitry which

3. LIMITING CONDITIONS FOR OPERATION

3.0 GENERAL ACTION REQUIREMENTS

3.0.1 When a Limiting Condition for Operation is not met, except as provided in action called for in the specification, within one hour action shall be initiated to place the unit in a condition in which the specification does not apply by placing it, as applicable, in :

1. At least HOT STANDBY within the next 6 hours.
2. At least HOT SHUTDOWN within the following 6 hours, and
3. At least COLD SHUTDOWN within the subsequent 24 hours.

Where corrective measures are completed that permit operation under the action requirements, the action may be taken in accordance with the time limits of the specification as measured from the time of failure to meet the Limiting Condition for Operation. Applicability of these requirements is stated in the individual specifications.

Specification 3.0.1 is not applicable in COLD SHUTDOWN OR REFUELING SHUTDOWN.

BASES

This specification delineates the action to be taken for circumstances not directly provided for in the action requirements of individual specifications and whose occurrence would violate the intent of the specification.

3.1 REACTOR COOLANT SYSTEM

3.1.1 OPERATIONAL COMPONENTS

Applicability

Applies to the operating status of reactor coolant system components.

Objective

To specify those limiting conditions for operation of reactor coolant system components which must be met to ensure safe reactor operations.

Specification

3.1.1.1 Reactor Coolant Pumps

a. Pump combinations permissible for given power levels shall be as shown in Specification Table 2.3.1.

b. Power operation with one idle reactor coolant pump in each loop shall be restricted to 24 hours. If the reactor is not returned to an acceptable RC pump operating combination at the end of the 24-hour period, the reactor shall be in a hot shutdown condition within the next 12 hours.

c. The boron concentration in the reactor coolant system shall not be reduced unless at least one reactor coolant pump or one decay heat removal pump is circulating reactor coolant.

3.1.1.2 Steam Generator

a. Both steam generators shall be operable whenever the reactor coolant average temperature is above 250°F.

3.1.1.3 Pressurizer Safety Valves

a. The reactor shall not remain critical unless both pressurizer code safety valves are operable with a lift setting of 2500 psig ± 1%.

b. When the reactor is subcritical, at least one pressurizer code safety valve shall be operable if all reactor coolant system openings are closed, except for hydrostatic tests in accordance with ASME Boiler and Pressure Vessel Code, Section III.

3.2 MAKEUP AND PURIFICATION AND CHEMICAL ADDITION SYSTEMS

Applicability

Applies to the operational status of the makeup and purification and the chemical addition systems.

Objective

To provide for adequate boration under all operating conditions to assure ability to bring the reactor to a cold shutdown condition.

Specification

The reactor shall not be critical unless the following conditions are met:

3.2.1 Two makeup and purification pumps are operable except as specified in 3.3.2. Specification 3.0.1 applies.

3.2.2 A source of concentrated boric acid solution, in addition to the borated water storage tank, is available and operable. This can be either:

a. The boric acid mix tank containing at least the equivalent of 906 ft^3 of 8700 ppm boron as boric acid solution with a temperature of at least 10°F above the crystallization temperature. System piping and valves necessary to establish a flow path from the tank to the makeup and purification system shall also be operable and shall have at least the same temperature requirement as the boric acid mix tank. One associated boric acid pump shall be operable.

b. A reclaimed boric acid storage tank containing at least the equivalent of 906 ft^3 of 8700 ppm boron as boric acid solution with a temperature of at least 10°F above the crystallization temperature. System piping and valves necessary to establish a flow path from the tank to the makeup and purification system shall also be operable and shall have at least the same temperature requirement as the reclaimed boric acid tank. One associated reclaimed boric acid pump shall be operable.

c. With neither the boric acid mix tank nor the reclaimed boric acid storage tank OPERABLE, restore one source to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to 1% delta k/k at 200°F; restore a concentrated boric acid source to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

Bases

The makeup and purification system and chemical addition systems provide control of the reactor coolant boron concentration. (1) This is normally accomplished by using any of the three makeup and purification pumps in series with a boric acid pump associated with the boric acid mix tank or a reclaimed boric acid pump associated with a reclaimed boric acid storage tank. The alternate method of boration will be the use of the makeup and purification pumps taking suction directly from the borated water storage tank. (2)

3.3 EMERGENCY CORE COOLING, REACTOR BUILDING EMERGENCY COOLING AND REACTOR BUILDING SPRAY SYSTEMS

Applicability

Applies to the operating status of the emergency core cooling, reactor building emergency cooling, and reactor building spray systems.

Objective

To define the conditions necessary to assure immediate availability of the emergency core cooling, reactor building emergency cooling and reactor building spray systems.

Specification

3.3.1 The reactor shall not be made critical unless the following conditions are met:

3.3.1.1 Injection Systems

a. The borated water storage tank shall contain a minimum of 350,000 gallons of water having a minimum concentration of 2,270 ppm boron at a temperature not less than 40°F. Specification 3.0.1 applies.

b. Two makeup pumps are operable in the engineered safeguards mode powered from independent essential busses. Specification 3.0.1 applies.

c. Two decay heat removal pumps are operable. Specification 3.0.1 applies.

d. Two decay heat removal coolers and their cooling water supplies are operable. (See Specification 3.3.1.4) Specification 3.0.1 applies.

e. Two BWST level instrument channels are operable.

f. The two reactor building sump isolation valves (DHV6A/B) shall be either manually or remote-manually operable. Specification 3.0.1 applies.

3.3.1.2 Core Flooding System

a. Two core flooding tanks each containing 1040 ± 30 ft^3 of borated water at 600 ± 25 psig shall be available. Specification 3.0.1 applies.

b. Core flooding tank boron concentration shall not be less than 2,270 ppm boron.

c. The electrically operated discharge valves from the core flood tank will be assured open by administrative control and position indication lamps on the engineered safeguards status panel. Respective breakers for these valves shall be open and conspicuously marked. Specification 3.0.1 applies.

d. One core flood tank pressure instrumentation channel and one core flood tank level instrumentation channel per tank shall be operable.

e. Core flood tank (CFT) vent valves CF-V3A and CF-V3B shall be closed and the breakers to the CFT vent valve motor operators shall be tagged open, except when adjusting core flood tank level and/or pressure. Specification 3.0.1 applies.

3.3.1.3 Reactor Building Spray System and Reactor Building Emergency Cooling System

The following components must be operable:

a. Two reactor building spray pumps and their associated spray nozzles headers and two reactor building emergency cooling fans and associated cooling units (one in each train). Specification 3.0.1 applies.

b. The sodium hydroxide (NaOH) tank level shall be maintained at 8 feet $\pm$ 6 inches lower than the BWST level as measured by the BWST/NaOH tank differential pressure indicator. The NaOH tank concentration shall be 10.0 $\pm$ .5 weight percent (%).

c. All manual valves in the discharge lines of the sodium hydroxide tank shall be locked open.

3.3.1.4 Cooling Water Systems Specification 3.0.1 applies.

a. Two nuclear service closed cycle cooling water pumps must be operable.

b. Two nuclear service river water pumps must be operable.

c. Two decay heat closed cycle cooling water pumps must be operable.

d. Two decay heat river water pumps must be operable.

e. Two reactor building emergency cooling river water pumps must be operable.

3.3.1.5 Engineered Safeguards Valves and Interlocks Associated with the Systems in specifications 3.3.1.1, 3.3.1.2, 3.3.1.3, 3.3.1.4 are operable. Specification 3.0.1 applies.

3.3.2 Maintenance shall be allowed during power operation on any component(s) in the makeup and purification, decay heat, RB emergency cooling water, RB spray, CFT pressure instrumentation, CFT level instrumentation, BWST level instrumentation, or cooling water systems which will not remove more than one train of each system from service. Components shall not be removed from service so that the affected system train is inoperable for more than 72 consecutive hours. If the system is not restored to meet the requirements of Specifications 3.3.1 within 72 hours, the reactor shall be placed in a cold shutdown condition within twelve hours.

3.3.3 Exceptions to 3.3.2 shall be as follows:

a. Both core flood tanks shall be operable at all times.

b. Both the motor operated valves associated with the core flood tanks shall be fully opened at all times.

c. One reactor building cooling fan and associated cooling unit shall be permitted to be out-of-service for seven days.

3.3.4 Prior to initiating maintenance on any of the components, the duplicate (redundant) component shall be tested to assure operability.

Bases

The requirements of Specification 3.3.1 assure that, before the reactor can be made critical, adequate engineered safety features are operable. Two engineered safeguards makeup pumps, two decay heat removal pumps and two decay heat removal coolers (along with their respective cooling water systems components) are specified. However, only one of each is necessary to supply emergency coolant to the reactor in the event of a loss-of-coolant accident. Both core flooding tanks are required because a single core flooding tank has insufficient inventory to reflood the core for hot and cold line breaks.

The borated water storage tank is used for three purposes:

A. As a supply of borated water for accident conditions.(1)

B. As a supply of borated water for flooding the fuel transfer canal during refueling operation.(2)

C. As an alternate source of borated water for reaching cold shutdown.(3)

Borated water storage capacity of 350,000 gallons in the BWST is required to supply emergency core cooling and reactor building spray in the event of a loss-of-coolant accident. The borated water storage tank capacity of 360,000 gallons is based on refueling volume requirements. Redundant heaters maintain the borated water supply at a temperature greater than 40°F.

The boron concentration is specified to be in excess of the amount of boron required to maintain the core 1 percent subcritical at 70 F without any control rods in the core. This concentration is 1609 ppm boron while the minimum value specified in the tanks is 2,270 ppm boron.

The post-accident reactor building emergency cooling may be accomplished by three emergency cooling units, by two spray systems, or by a combination of one emergency cooling unit and one spray system. The specified requirements assure that the required post-accident components are available.(4)

3.4 DECAY HEAT REMOVAL - TURBINE CYCLE

Applicability

Applies to the operating status of equipment that functions to remove decay heat, utilizing the secondary side of the Steam Generators.

Objective

To define the conditions necessary to assure immediate availability of the Emergency Feedwater (EFW) System and Main Steam Safety Valves.

Specification

3.4.1 With the Reactor Coolant System temperature greater than 250°F, three independent EFW pumps and associated flow paths shall be OPERABLE with:

a. Two EFW pumps, each capable of being powered from an OPERABLE emergency bus, and one EFW pump capable of being powered from an OPERABLE steam supply system. Specification 3.0.1 applies.

b. With one pump or flow path* inoperable, restore the inoperable pump or flow path to OPERABLE status within 72 hours or be in COLD SHUTDOWN within the next 12 hours. With more than one EFW pump or flow path* inoperable, restore the inoperable pumps or flow paths* to OPERABLE status or be subcritical within 1 hour, in at least HOT SHUTDOWN within the next 6 hours, and in COLD SHUTDOWN within the following 6 hours.

c. Four of six turbine bypass valves are OPERABLE.

d. The condensate storage tanks (CST) shall be OPERABLE with a minimum of 150,000 gallons of condensate available in each CST. With a CST inoperable, restore the CST to operability within 72 hours or be in at least HOT SHUTDOWN within the next 6 hours, and COLD SHUTDOWN within the next 30 hours. With more than one CST inoperable, restore the inoperable CST to OPERABLE status or be subcritical within 1 hour, in at least HOT SHUTDOWN within the next 6 hours, and in COLD SHUTDOWN within the following 6 hours. Specification 3.0.1 applies.

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*For the purpose of this requirement, an OPERABLE flow path shall mean an unobstructed path from the water source to the pump and from the pump to a steam generator.

3.5 INSTRUMENTATION SYSTEMS

3.5.1 OPERATIONAL SAFETY INSTRUMENTATION

Applicability

Applies to unit instrumentation and control systems.

Objective

To delineate the conditions of the unit instrumentation and safety circuits necessary to assure reactor safety.

Specifications

3.5.1.1 The reactor shall not be in a startup mode or in a critical state unless the requirements of Table 3.5-1, Column 'A' and 'B' are met. Specification 3.0.1 applies.

3.5.1.2 For on-line testing or in the event of a protection instrument or channel failure, a key operated channel bypass switch associated with each reactor protection channel will be used to lock the reactor trip module in the untripped state as indicated by a light. Only one channel shall be locked in this untripped state at any one time. Unit operation at rated power shall be permitted to continue with Table 3.5-1, Column "A". Only one channel bypass key shall be kept in the control room.

3.5.1.3 In the event the number of protection channels operable falls below the limit given under Table 3.5-1, Column "A", operation shall be limited as specified in Column "C". Specification 3.0.1 applies.

3.5.1.4 The key operated shutdown bypass switch associated with each reactor protection channel shall not be used during reactor power operation (except for required maintenance or testing).

3.5.1.5 During startup when the intermediate range instruments come on scale, the overlap between the intermediate range and the source range instrumentation shall not be less than one decade.

3.5.1.6 In the event that one of the trip devices in either of the sources supplying power to the control rod drive mechanisms fails in the untripped state, the power supplied to the rod drive mechanisms through the failed trip device shall be manually removed within 30 minutes. The condition will be corrected. The remaining trip device shall be tested within eight hours. If the condition is not corrected and the remaining trip devices are not tested within the 8 hour period, the reactor shall be placed in the hot shutdown condition within an additional 4 hours.

Bases

Every reasonable effort will be made to maintain all safety instrumentation in operation. A startup is not permitted unless three power range neutron instrument channels and two channels each of the following are operable: four

for any reason, reactor operation is permissible for the succeeding seven days provided that during such seven days the operable diesel generator is tested immediately and daily. In the event two diesel generators are inoperable, the unit shall be placed in hot shutdown in 12 hours. If one diesel is not operable within an additional 24 hour period, the plant shall be placed in cold shutdown within an additional 24 hours thereafter.

With one diesel generator inoperable, in addition to the above, verify that: All required systems, subsystems, trains, components and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE or follow specifications 3.0.1.

d. If one Unit Auxiliary Transformer is inoperable and a 4160 volt tie from Unit 2 transformer cannot be placed in service and a diesel generator becomes inoperable, the unit will be placed in hot shutdown within 12 hours. If one of the above sources of power is not made operable within an additional 24 hours, the unit shall be placed in cold shutdown within an additional 24 hours thereafter.

e. If Unit 1 is separated from the system while carrying its own auxiliaries, or if only one 230 kv line is in service, continued reactor operation is permissible provided one emergency diesel generator shall be started and run continuously until two transmission lines are restored.

f. The engineered safeguards electrical bus, switchgear, load shedding, and automatic diesel start systems shall be operable except as provided in Specification 3.7.2c above and as required for testing.

g. One station battery may be removed from service for not more than eight hours.

BASES

The Unit Electrical Power System is designed to provide a reliable source of power for balance of plant auxiliaries and a continuously available power supply for the engineered safeguards equipment. The availability of the various components of the Unit Electric Power System dictates the permissible mode of station operation.

Operating Logs document equipment operability in accordance with existing administrative procedures.