

August 10, 1990

Docket No. 50-289

Mr. Henry D. Hukill, Vice President  
and Director - TMI-1  
GPU Nuclear Corporation  
P. O. Box 480  
Middletown, Pennsylvania 17057

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Dear Mr. Hukill:

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. 76822)

The Commission has issued the enclosed Amendment No. 154 to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit No. 1, in response to your letter dated March 23, 1990.

The amendment extends the Facility Operating License expiration date from May 18, 2008 to April 19, 2014.

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

Sincerely,

/s/

Ronald W. Hernan, Senior Project Manager  
Project Directorate I-4  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 154 to DPR-50
2. Safety Evaluation

cc w/enclosures:  
See next page

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Mr. Henry D. Hukill  
GPU Nuclear Corporation

Three Mile Island Nuclear Station,  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

METROPOLITAN EDISON COMPANY

JERSEY CENTRAL POWER & 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. 154  
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 licensee) dated March 23, 1990 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.

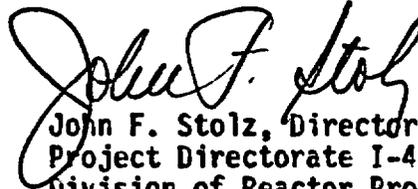
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2. Accordingly, the expiration statement on page 7 of Facility Operating License No. DPR-50 is hereby amended to read as follows:

This license is effective as of the date of issuance and shall expire at midnight April 19, 2014.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



John F. Stolz, Director  
Project Directorate I-4  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment:  
Page 7 of license

Date of Issuance: August 10, 1990

5. GPU Nuclear Corporation shall provide routine reporting of the long-term corrosion "lead tests" test results on a quarterly basis as well as more timely notification if adverse corrosion test results are discovered.

(9) Long Range Planning Program

The "Plan for the Long Range Planning Program for the Three Mile Island Nuclear Station - Unit 1" (the Plan) submitted by GPUN letter C311-88-2030 dated March 16, 1988 is approved.

- a. The Plan shall be followed by the Licensee from and after May 27, 1988.
- b. The Category A schedule shall not be changed without prior approval from the NRC. Categories B and C schedules may be changed without prior approval by NRC.

This license is effective as of the date of issuance and shall expire at midnight, April 19, 2014.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by  
A. Giambusso

A. Giambusso, Deputy Director  
for Reactor Projects  
Directorate of Licensing

Attachment: Appendix A  
Technical Specifications

Date of Issuance: April 19, 1974



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 154 TO FACILITY OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY  
JERSEY CENTRAL POWER & LIGHT COMPANY  
PENNSYLVANIA ELECTRIC COMPANY  
GPU NUCLEAR CORPORATION

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

1.0 INTRODUCTION

By letter dated March 23, 1990, GPU Nuclear Corporation (GPUN) requested an amendment to Facility Operating Licensee No. DPR-50 to extend the expiration date of the license from May 18, 2008 to April 19, 2014. In support of their request, GPUN submitted the results of their assessment of the safety implications and environmental impacts of operating the facility for an additional 5 years and 11 months.

2.0 DISCUSSION

Section 103.c of the Atomic Energy Act of 1954 states that a license is to be issued for a specified period not to exceed 40 years. Title 10 CFR 50.51 specifies that each license will be issued for a fixed period of time not to exceed 40 years from the date of issuance. The currently licensed term for Three Mile Island Unit 1 (TMI-1) is 40 years commencing with the issuance of the construction permit which was on May 18, 1968. Accounting for the time that was required for plant construction, this represents an effective operating license term of approximately 34 years. Consistent with Section 103.c of the Atomic Energy Act and Section 50.51 of the Commission's regulations, the licensee, by the March 23, 1990 application, seeks an extension of the operating license term for TMI-1 so the fixed period of the license would be from the date of the operating license issuance.

3.0 EVALUATION

The NRC staff has evaluated the safety issues associated with issuance of the proposed license amendment which would allow approximately 6 additional years of operation. The issues addressed consist of additional radiation exposure to the licensee's operating staff, impacts on the off-site population, and the general aging of the plant structures and equipment. The impact of additional radiation exposure to the facility operating staff and the impact on the general population in the vicinity of TMI-1 are addressed in the NRC staff's Environmental Assessment dated

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### 3.1 Plant Structures and Systems

TMI-1 was designed, constructed and licensed for a 40-year service life as discussed in the TMI-1 Final Safety Analysis Report (FSAR). This design life is based upon operation at a thermal power level of 2568 MWt with a cumulative lifetime capacity factor of 80%. The Unit cumulative capacity factor to date is about 45%, due in part to the fact that TMI-1 was maintained in a cold shutdown condition for a period of approximately 6 years from 1979-1985. Accordingly, none of the licensing issues forming the basis for the initial issuance of the operating license need be reconsidered in connection with this proposed amendment, since the amendment is supported by the initial licensing record. The rated thermal power upgrade to 2568 MWt was described in TMI-1 Technical Specification Change Request No. 184 which resulted in License Amendment No. 143, dated July 26, 1988.

The 40-year service life design criteria does not imply that some equipment and components will not wear out or require replacement during the plant lifetime. Design features were included in the construction and subsequent modification of TMI-1 which ensure the ability to test, inspect, and perform preventive and corrective maintenance of the plant structures, systems and components. Existing surveillance and maintenance programs are sufficient to maintain or determine the need for replacement of safety related components. Periodic inservice inspection and testing (ISI and IST) requirements have been incorporated into the plant Technical Specifications (TS) and procedures to ensure that degradation to these systems, equipment or structures will be identified and corrected in a timely manner.

The primary side pressure boundary components within the Nuclear Steam Supply System (NSSS) scope were designed and constructed for a 40-year design life. The equipment design life is based on the time period of exposure to an operating environment. The 40-year design is equivalent to 32 Effective Full Power Years (EFPYs). During the plant construction, materials were not exposed to the operating environment except for system functional tests. The system components were not subjected to a radiation environment until after the operating license became effective. The licensee is committed to a periodic inservice inspection program for the reactor coolant system per TS Section 4.2. Additional monitoring programs are currently in effect or are being developed to evaluate thermal/pressure cycles and to monitor fatigue effects on key components.

The B&W Owners Group Integrated Reactor Vessel Material Surveillance Program (BAW-1543, Rev. 2A), approved by the NRC for TMI-1 in a letter dated May 27, 1986, provides the means for continuously monitoring of the reactor vessel throughout the life of the plant. The analyses of the TMI-1 plant specific surveillance capsules have confirmed that the predictions used in the analytical techniques for establishing operating limitations for the reactor vessel are conservative. Future TMI-1 plant specific material surveillance capsules will be analyzed at specified times throughout plant life in order to continue to ensure that the predictions used in the analytical techniques for establishing future operating limitations for the reactor vessel remain conservative.

Equipment outside the NSSS scope which is safety-related were similarly designed and constructed, and are being inspected and tested by appropriate Technical Specification and ISI/IST program requirements. It is concluded that the above equipment, with any necessary replacement, will be satisfactory for a 40 year operating life.

### 3.2 Pressurized Thermal Shock

The licensee provided an assessment of the fracture toughness requirements for protection against pressurized thermal shock as required by 10 CFR 50.61 on January 23, 1986. That assessment concluded that the screening criteria would be met for the limiting weld at the expiration of the current operating license. The staff's evaluation and acceptance of the fracture toughness assessment is documented in a safety evaluation dated November 25, 1986.

Other recent TMI-1 reactor pressure vessel (RPV) fluence projections have been provided in B&W Topical Report BAW-1901, "Analysis of Capsule TMI-1-C, GPUN, TMI-1," March, 1986. This report was submitted to the NRC on May 5, 1986. Based on the analysis of Capsule TMI-1-C, the calculated cumulative fast fluences of the reactor vessel were below those previously projected, resulting in a reduction of the previously reported  $RT_{PTS}$ . At the proposed license expiration date of April 19, 2014, TMI-1 core exposure is estimated at 26 EFPY, assuming a 0.80 utilization factor for future cycles. The accumulated fluence at the inside reactor vessel surface at 26 EFPY, assuming 24 month cycles with a modified very low leakage core design, and operation at 2568 Mwt, is now projected to be  $6.8E18n/cm^2$ . Utilizing Regulatory Guide 1.99, Revision 2, which is expected to be adopted for application to the PTS Evaluation in the near future, this fluence gives a PTS Evaluation reference temperature of 262°F at the critical weld (SA-1526), which meets the screening criteria of 270°F at the proposed license expiration date.

The licensee is monitoring reactor vessel fluence with external reactor cavity dosimetry installed for operating Cycle 7 will continue to participate in efforts to refine the evaluation of material fracture toughness properties, fluence analyses and dosimetry and vessel flux reduction using improved cycle design techniques. Any undesirable changes with respect to the screening criteria will be identified early and appropriate corrective actions or analyses undertaken. Current fluence projections at the proposed license expiration date are therefore considered to be acceptable.

### 3.3 Electrical Equipment and Environmental Qualification

The Environmental Qualification (EQ) program for electrical equipment operating in a harsh environment is described in the TMI-1 FSAR, Appendix 6B. The program ensures that EQ is maintained for required electrical equipment within the scope of 10 CFR 50.49.

Aging analyses have been performed for safety-related electrical equipment in accordance with 10 CFR 50.49, Environmental Qualification, to identify qualified lifetimes for this equipment. These lifetimes are incorporated into plant

equipment maintenance and replacement practices to ensure that safety-related electrical equipment remains qualified and available to perform its safety function regardless of the overall age of the plant. Therefore, the electrical systems design, electrical equipment selection and application, and environmental qualification of electrical equipment is not impacted by a 40-year operational lifetime.

The TMI-1 EQ program was evaluated by NRC and found acceptable in a safety evaluation dated April 18, 1985.

### 3.4 Spent Fuel Storage

In its submittal, the licensee stated that spent fuel generated between 2008 and 2014 is not a concern with respect to spent fuel pool storage capacity. The existing TMI-1 spent fuel pool racks will lose full core reserve margin after the refueling outage in 1991. The licensee has contracted for services to design, license and install new high density, poison spent fuel racks in the TMI-1 spent fuel pools. While the design and licensing will provide for a maximum total safe capacity, the actual installation in early 1992 is planned to include sufficient rack capacity to provide storage capacity through 2008. Additional racks can be added as necessary thereafter to support continued operation up to the new licensed limit. In any event, it is anticipated that the new design using high density, poison racks will assure spent fuel storage capacity in the TMI-1 spent fuel pools to provide storage capacity substantially in excess of that required to support operation through 2014 based on current operational plans.

TMI-1 is currently operating on an 18 month cycle and is implementing 24 month cycles beginning with Cycle 9. This will result in less total spent fuel generated than previously projected even with the extended operating period.

### 3.5 Inservice Inspection (ISI) and Inservice Test (IST) Programs

The TMI-1 ongoing ISI and IST programs are maintained in accordance with 10 CFR 50.55a. The surveillance requirements for the ISI and IST programs for ASME Code Class 1, Class 2, and Class 3 components are contained in TMI-1 Technical Specification Section 4.2, Reactor Coolant System. The requirements for the IST program are specified by the Facility Operating License, No. DPR-50, Section C, license condition (6).

In addition to the ISI and IST programs, the following TMI-1 Technical Specifications also provide additional requirements for monitoring, component aging and the cumulative effects of power operation over the life of the plant.

- a) Specification 4.19 - Once Through Steam Generator (OTSG) tube portion Inservice Inspection.

This specification provides augmented ISI of the OTSG tube portion of the reactor coolant pressure boundary to assure continued integrity. The results of these augmented inspections are submitted by report to NRC and include:

1. Number and extent of tubes inspected.
2. Location and percent of wall-thickness penetration for each indication of an imperfection.
3. Identification of tubes repaired or removed from service.

b) **Specification 3.1.2 Pressurization Heatup and Cooldown Limitations**

Temperature and pressure changes during heatup, cooldown and normal operation of the reactor coolant system are limited to protect against non-ductile failure of the reactor coolant system. These limits are established in accordance with the requirements of 10 CFR 50, Appendix G, and calculated utilizing the procedures defined in Regulatory Guide 1.99, Revision 2.

This specification includes a reactor vessel material surveillance program that monitors reactor vessel embrittlement over the 40-year design life in accordance with 10 CFR 50, Appendix H. Reactor vessel irradiation specimens are removed and examined at specific intervals to determine changes in material properties. The results of these examinations are then submitted for NRC review and are used to update the pressure and temperature limits.

c) **Specification 4.2 Reactor Coolant System Inservice Inspection**

As described above, this specification contains the ISI and IST surveillance requirements for ASME Code Class 1, Class 2, and Class 3 components that ensure the continuing integrity of the reactor coolant system throughout the life of the plant. In addition to the ISI and IST programs, this specification also contains requirements for special inspections of the reactor coolant pump motor flywheel assemblies and primary coolant system pressure isolation valves.

d) **Specification 3.19.1 Containment Structural Integrity**

This specification defines the inservice tendon surveillance program for the reactor building prestressing system. This surveillance program monitors potential tendon steel relaxation or concrete creep and ensures continued structural integrity of the reactor building throughout the life of the plant.

e) **Specification 4.4.1 Containment Leakage Tests**

This specification establishes the requirements for the performance of periodic integrated and local leakage rate tests in accordance

with 10 CFR 50, Appendix J. These tests are performed during the life of the plant to ensure that reactor building leakage remains within allowable limits.

### 3.6 Summary of Findings

Based upon the above, we find that extension of the operating license for TMI-1 to allow a 40-year service life is consistent with the safety analyses for the facility and that the Commission's previous safety findings are not changed. All issues associated with plant systems and equipment, including aging and changes in RPV fracture toughness properties, have been addressed and are acceptable for 40 years of operation.

### 4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact have been prepared and published in the Federal Register on July 23, 1990 (55 FR 29921). Accordingly, based upon the environmental assessment, we have determined that the issuance of the amendment will not have a significant effect on the quality of the human environment.

### 5.0 CONCLUSION

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

Dated: August 10, 1990

Principal Contributor:

R. Hernan