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Docket No. 50-289

Mr. Henry D. Hukill
Vice President
GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057

Dear Mr. Hukill:

The Commission has issued the enclosed Amendment No. 80 to Facility Operating License No. DPR-50 for Three Mile Island Nuclear Station, Unit No. 1 (TMI-1). The amendment consists of changes to the Technical Specifications (TSs) in response to your request dated November 23, 1981 (TSCR No. 107) as modified and supplemented by your letters dated September 3, 1981, November 23, 1981, August 11, 1982, and January 5, 1983.

The amendment revises the TSs for TMI-1 to eliminate use of sodium thiosulfate as a spray additive in the Reactor Building Spray System (RBSS). The amendment also specifies the required sodium hydroxide (NaOH) concentration in the NaOH Tank of the RBSS and the required height differential to be maintained between the Borated Water Storage Tank and the NaOH Tank.

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

Sincerely,

Original signed by

James Van Vliet, Project Manager
Operating Reactors Branch #4
Division of Licensing

Enclosures:
1. Amendment No. 80 to DPR-50
2. Safety Evaluation
3. Notice

cc w/enclosures:
See next page

No legal objection to issue
of FR Notice and Amendment.
SER has not reviewed.
Cutchin

OFFICE	ORB#4:DL	ORB#4:DL	C-ORB#4:DL	AD:OR:DL	OELD	ORB#4:DL	
SURNAME	RIngram	RJacobs;cf	JStolz	GLainas	MCutchin	J Van Vliet	
DATE	1/1?/83	1/14/83	1/14/83	1/18/83	1/19/83	1/14/83	

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555
February 24, 1983

DISTRIBUTION:
Docket File
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Docket No. 50-289

Docketing and Service Section
Office of the Secretary of the Commission

SUBJECT: THREE MILE ISLAND, UNIT NO. 1

Two signed originals of the Federal Register Notice identified below are enclosed for your transmittal to the Office of the Federal Register for publication. Additional conformed copies (12) of the Notice are enclosed for your use.

- ☐ Notice of Receipt of Application for Construction Permit(s) and Operating License(s).
- ☐ Notice of Receipt of Partial Application for Construction Permit(s) and Facility License(s): Time for Submission of Views on Antitrust Matters.
- ☐ Notice of Availability of Applicant's Environmental Report.
- ☐ Notice of Proposed Issuance of Amendment to Facility Operating License.
- ☐ Notice of Receipt of Application for Facility License(s); Notice of Availability of Applicant's Environmental Report; and Notice of Consideration of Issuance of Facility License(s) and Notice of Opportunity for Hearing.
- ☐ Notice of Availability of NRC Draft/Final Environmental Statement.
- ☐ Notice of Limited Work Authorization.
- ☐ Notice of Availability of Safety Evaluation Report.
- ☐ Notice of Issuance of Construction Permit(s).
- ☒ Notice of Issuance of Facility Operating License(s) or Amendment(s).
- ☒ Other: Amendment No. 80.
  Referenced documents have been provided PDR.

Division of Licensing, ORB#4
Office of Nuclear Reactor Regulation

Enclosure:
As Stated

OFFICE	ORB#4:DL					
SURNAME	RIngram;cf					
DATE	2/28/83					

NRC FORM 102 7—79

Mr. R. J. Toole
Manager, TMI-1
GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057

Board of Directors
P. A. N. E.
P. O. Box 268
Middletown, Pennsylvania 17057

*Docketing and Service Section
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Chauncey Kepford
Judith H. Johnsrud
Environmental Coalition on Nuclear Power
433 Orlando Avenue
State College, Pennsylvania 16801

J. B. Lieberman, Esq.
Berlock, Israel & Lieberman
26 Broadway
New York, New York 10004

Mr. Ronald C. Haynes, Regional Administrator
U. S. N. R. C., Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

ANGRY/TMI PIRC
1037 Maclay Street
Harrisburg, Pennsylvania 17103

John Levin, Esq.
Pennsylvania Public Utilities
Commission
Box 3265
Harrisburg, Pennsylvania 17120

Jordan D. Cunningham, Esq.
Fox, Farr and Cunningham
2320 North 2nd Street
Harrisburg, Pennsylvania 17110

Ms. Louise Bradford
TMIA
1011 Green Street
Harrisburg, Pennsylvania 17102

Ms. Marjorie M. Aamodt
R. D. #5
Coatesville, Pennsylvania 19320

Earl B. Hoffman
Dauphin County Commissioner
Dauphin County Courthouse
Front and Market Streets
Harrisburg, Pennsylvania 17101

Union of Concerned Scientists
c/o - Harmon & Weiss
1725 I Street, N. W.
Suite 506
Washington, D. C. 20006

Mr. Steven C. Sholly
Union of Concerned Scientists
1346 Connecticut Avenue, N. W.
Dupont Circle Building, Suite 1101
Washington, D. C. 20036

Mr. Thomas Gerusky
Bureau of Radiation Protection
Department of Environmental Resources
P. O. Box 2063
Harrisburg, Pennsylvania 17120

General Counsel
Federal Emergency Management Agency
ATTN: Docket Clerk
1725 I Street, NW
Washington, DC 20472

Karin W. Carter, Esq.
505 Executive House
P. O. Box 2357
Harrisburg, Pennsylvania 17120

G. F. Trowbridge, Esq.
Shaw, Pittman, Potts & Trowbridge
1800 M Street, N.W.
Washington, D. C. 20036

Dauphin County Office Emergency Preparedness
Court House, Room 7
Front & Market Streets
Harrisburg, Pennsylvania 17101

Mr. E. G. Wallace
Licensing Manager
GPU Nuclear Corporation
100 Interpace Parkway
Parsippany, New Jersey 07054

William S. Jordan, III, Esq.
Harmon & Weiss
1725 I Street, NW, Suite 506
Washington, DC 20006

Ms. Lennie Prough
U. S. N. R. C. - TMI Site
P. O. Box 311
Middletown, Pennsylvania 17057

Ms. Virginia Southard, Chairman
Citizens for a Safe Environment
264 Walton Street
Lemoyne, Pennsylvania 17043

Mr. Robert B. Borsum
Babcock & Wilcox
Nuclear Power Generation Division
Suite 220, 7910 Woodmont Avenue
Bethesda, Maryland 20814

Mr. David D. Maxwell, Chairman
Board of Supervisors
Londonderry Township
RFD#1 - Geyers Church Road
Middletown, Pennsylvania 17057

Mr. C. W. Smyth
Supervisor of Licensing TMI-1
GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057

Regional Radiation Representative
EPA Region III
Curtis Building (Sixth Floor)
6th and Walnut Streets
Philadelphia, Pennsylvania 19106

Mr. Richard Conte
Senior Resident Inspector (TMI-1)
U.S.N.R.C.
P. O. Box 311
Middletown, Pennsylvania 17057

Governor's Office of State Planning and Development
ATTN: Coordinator, Pennsylvania State Clearinghouse
P. O. Box 1323
Harrisburg, Pennsylvania 17120

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. 80
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 November 23, 1981, as modified and supplemented September 3, 1981, November 23, 1981, August 11, 1982, and January 5, 1983, 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:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 80 , 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 six weeks after its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz

John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing

Attachment:
Changes to the Technical
  Specifications

Date of Issuance: February 24, 1983

ATTACHMENT TO LICENSE AMENDMENT NO. 80

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 area of change.

Remove	Insert
3-22	3-22
3-23*	3-23
3-24	3-24
4-7	4-7
4-10	4-10

*Overleaf page provided to maintain document completeness.

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

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).

b. The sodium hydroxide (NaOH) tank level shall be maintained at 8 feet ± 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 ± .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

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.

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)

The iodine removal function of the reactor building spray system requires one spray pump and sodium hydroxide tank contents.

The spray system utilizes common suction lines with the decay heat removal system. If a single train of equipment is removed from either system, the other train must be assured to be operable in each system.

When the reactor is critical, maintenance is allowed per Specification 3.3.2 and 3.3.3 provided requirements in Specification 3.3.4 are met which assure operability of the duplicate components. The specified maintenance times are a maximum. Operability of the specified components shall be based on the results of testing as required by Technical Specification 4.5.

An allowable maintenance period of up to 72 hours may be utilized if the operability of equipment redundant to that removed from service is demonstrated immediately prior to removal.

In the event that the need for emergency core cooling should occur, operation of one makeup pump, one decay heat removal pump, and both core flood tanks will protect the core. In the event of a reactor coolant system rupture their operation will limit the peak clad temperature to less than 2,300 F and the metal-water reaction to that representing less than 1 percent of the clad.

Two nuclear service river water pumps and two nuclear service closed cycle cooling pumps are required for normal operation. The normal operating requirements are greater than the emergency requirements following a loss-of-coolant.

REFERENCES

(1) FSAR, Section 14.2.2.3

(2) FSAR, Section 9.5.2

(3) FSAR, Section 15.3.2

(4) FSAR, Section 14.2.2.3.4

TABLE 4.1-1 (Continued)

	CHANNEL DESCRIPTION	CHECK	TEST	CALIBRATE	REMARKS
38.	Steam Generator Water Level	W	NA	R	
39.	Turbine Overspeed Trip	NA	R*	NA	
40.	BWST/NaOH Differential Pressure Indicator	NA	NA	R	
41.	Sodium Hydroxide Tank Level Indicator	NA	NA	R	
42.	Diesel Generator Protective Relaying	NA	NA	R	
43.	4 KV ES Bus Undervoltage Relays (Diesel Start)				
	a. Degraded Grid	NA	M(1)	R	(1) Relay operation will be checked by local test pushbuttons
	b. Loss of Voltage	NA	M(1)	R	(1) Relay operation will be checked by local test pushbuttons
44.	Reactor Coolant Pressure DH Valve Interlock Bistable	S(1)	M	R	(1) When reactor coolant system is pressurized above 300 psig or Taves is greater than 200°F.
45.	Loss of Feedwater Reactor Trip	S(1)	M(1)	R	(1) When reactor power exceeds 7% power
46.	Turbine Trip/Reactor Trip	S(1)	M(1)	R	(1) When reactor power exceeds 20% power
47.a	Pressurizer Code Safety Valve and PORV tailpipe flow monitors	S(1)	.	R	(1) When T_{ave} is greater than 525°F
.b	PORV - Acoustic/Flow	NA	M(1)	R	(1) When T_{ave} is greater than 525°F
48.	PORV Setpoints	NA	M(1)	R	(1) Per Specification 3.1.12 excluding valve operation.

*Test to be performed prior to exceeding 20% power during Cycle 5 startup only.

TABLE 4.1-3 (Continued)

Item	Check	Frequency
11. Deleted		
12. Condenser Partition Factor	I^{131} Partition Factor	Once if primary/secondary leakage develops, i.e.: Gross Beta-Gamma on secondary side of OTSG is greater than 2×10^{-8} micro curies per cc and evidence of fission products is present

(1) When radioactivity level is greater than 10 percent of the limits of Specification 3.1.4, the sampling frequency shall be increased to a minimum of 5 times per week.

(2) $\bar{E}$ determination will be started when the 15 minute gross degassed beta-gamma activity analysis indicates greater than 10 μCi/ml and will be redetermined each 10 μCi/ml increase in the 15 minute gross degassed beta-gamma activity analysis. A radio chemical analysis for this purpose shall consist of a quantitative measurement of 95 percent of radionuclides in reactor coolant with half lives of >30 minutes.

(3) When the gross activity increases by a factor of two above background, an iodine analysis will be made and performed thereafter when the gross activity increases by 10 percent.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 80 TO FACILITY OPERATING LICENSE NO. DPR-50

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

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

I. Introduction

By letters dated September 3, 1981 (L1L-149), November 23, 1981 (TSCR No. 107, L1L-333) and January 5, 1983 (TSCR No. 107, Rev. 1), GPU Nuclear (the licensee) proposed changes to the Technical Specifications (TSs) appended to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit No. 1 (TMI-1). The changes involve modifying the TSs associated with the Reactor Building Spray System (RBSS) since the licensee has modified the RBSS by removing one of the spray additive tanks.

II. Background

The original design of the TMI-1 RBSS included two spray additive chemicals for accident iodine removal and pH control: sodium hydroxide solution and sodium thiosulfate solution. These were stored in separate tanks. On RBSS actuation, solutions would drain from these tanks to the main line carrying spray water from the borated water storage tank (BWST) to the spray headers. In response to NRC concerns over the practicality of such dual-additive, gravity-feed systems, the licensee performed draw-down tests to determine whether the flow from the additive tanks would be as designed. The NRC staff, in a March 7, 1980 letter to the licensee, concluded that the results of the test were not satisfactory, and recommended either a series of verification tests, or removal of the sodium thiosulfate additive, and a demonstration that the remaining sodium hydroxide (NaOH) system would be acceptable with respect to pH range, iodine removal effectiveness, and offsite dose considerations.

In response, the licensee submitted proposed modifications to the containment spray additive system, along with appropriate TS changes (letters dated September 3, 1981; November 23, 1981; and August 11, 1982). The proposed changes include the thiosulfate deletion, a reduction of the NaOH concentration designed to optimize the effectiveness of NaOH as a fission product scrubbing additive within acceptable ranges of pH, and reduction of the difference in NaOH tank and BWST levels to assure acceptable NaOH concentration during accident conditions.

III. Discussion

The RBSS serves the dual purpose of heat removal and fission product cleanup following a postulated large loss-of-coolant accident (LOCA). To enhance the iodine removal effectiveness of the spray, to ensure long-term iodine retention in the sump water, and to buffer the acidic Emergency Core Cooling System (ECCS) solution for materials compatibility, an additive is injected into the boric acid solution used to feed the containment spray headers. The licensee proposed modifying the TMI-1 TSs to reflect a change, from a mixture of NaOH and sodium thiosulfate solutions as additives, to a system using only NaOH.

The NaOH system has the advantage of less complexity in system hardware and operation, as well as greater materials compatibility of the resulting alkalinized boric acid solution in the containment sump. To optimize the performance of the system within acceptable ranges of pH, the system design should be such that the spray solution pH does not exceed 10.5, while the sump solution, after mixing with the unbuffered ECCS solution, is raised to an alkaline pH as high as, but not exceeding, a pH value of about 8.5.

The licensee indicated in their submittals that the RBSS as modified, and when operated with the proposed TS revisions, will operate satisfactorily and meet the above criteria. In order to achieve the above criteria, the licensee proposed in their January 5, 1983 submittal to limit NaOH tank concentration to between 9.5 and 10.5 weight percent NaOH and to limit the height differential between the BWST and the NaOH tank to 8 feet $\pm$ 6 inches. We have reviewed this information and determined that there is reasonable assurance that the modified spray system will operate as designed, and that the pH of the spray and sump solutions will be within the satisfactory range. The licensee's analysis of the performance of the spray additive system is based on a fluid flow model, which was validated by comparing its results to those of the full-flow draw-down tests performed on the three-tank system. We find that because the modified system should have similar flow characteristics, the flow model (as revised to reflect the system modifications) can be used to provide reasonable estimates of system performance for the new system configuration.

The iodine removal effectiveness of the spray system with sodium hydroxide was independently evaluated by the NRC staff to determine whether the proposed system modifications would result in changes in the calculated off-site doses for the postulated design basis accident (DBA). The main differences in iodine removal effectiveness arising from the system modifications are: (1) organic forms of iodine would not be removed by the NaOH additive, while some (limited) removal credit had been given for the thiosulfate, and (2) an overall long-term reduction of 99.9% of the elemental iodine had been assumed for the thiosulfate system, which exceeds the maximum value attainable for the sodium hydroxide system. The calculations of DBA doses were made in accordance with the current version of the Standard Review Plan (NUREG-0800, sections 6.5.2 and 15.6.5, Appendix A). We also used the current estimate of the atmospheric dispersion characteristics of the TMI site. The results of these calculations, along with the pertinent assumptions, are summarized in Table 1.

These calculated results are somewhat different from those in the July 11, 1973 initial licensing Safety Evaluation Report, reflecting changes both in the containment spray and in the atmospheric dispersion coefficients. All dose estimates, however, are substantially lower than the 10 CFR 100 guideline values of 300 rem to the thyroid, and 25 rem whole body and thus the potential consequences of the postulated LOCA are acceptable.

IV. Conclusion

We have evaluated the proposed modifications of the TMI-1 RBSS and associated TS changes. We find that the modifications to the system provide reasonable assurance that it will operate as designed. Further, we find that the proposed NaOH concentration (9.5 to 10.5 percent by weight) will assure efficient iodine removal, and that the proposed height difference (8 feet + 6 inches) between the NaOH tank and the BWST to facilitate mixing is satisfactory. Therefore, we find the proposed changes acceptable.

We have determined that the amendment does 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 amendment involves 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 this amendment.

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated, does not create the possibility of an accident of a type different from any evaluated previously, and does not involve a significant reduction in a margin of safety, the amendment does 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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: February 24, 1983

The following NRC personnel have contributed to this Safety Evaluation: P. Easley, W. Pasedag, R. Jacobs.

TABLE 1

CALCULATION OF WHOLE BODY AND THYROID DOSES FOR THE DESIGN BASIS LOSS-OF-COOLANT ACCIDENT

I. Assumptions:

Power		2535 MWt
Containment Leak Rate,	first 24 hrs.	0.1% per day
	after 24 hrs.	0.05% per day
Spray Effectiveness		
Elemental I removal coefficient		10 per hr.
Organic I removal coefficient		0
Particulate I removal coefficient		0.45 per hr.
Final elemental iodine decontamination factor, based on minimum sump pH = 8		42
Atmospheric Dispersion		
Relative concentrations:	0-2 hrs at EAB*	8.3×10^{-4} sec/m^3
	0-8 hrs at LPZ**	6.9×10^{-5} sec/m^3
	8-24 hrs at LPZ	4.8×10^{-5} sec/m^3
	24-96 hrs at LPZ	2.3×10^{-5} sec/m^3
	96-720 hrs at LPZ	7.5×10^{-6} sec/m^3

II. Calculated Doses:

	EAB	LPZ
Thyroid (rem)	166	89
Whole body (rem)	4.3	1

* Exclusion Area Boundary
** Low Population Zone

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-289

METROPOLITAN EDISON COMPANY

JERSEY CENTRAL POWER AND LIGHT COMPANY

PENNSYLVANIA ELECTRIC COMPANY

GPU NUCLEAR CORPORATION

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 80 to Facility Operating License No. DPR-50, issued to Metropolitan Edison Company, Jersey Central Power and Light Company, Pennsylvania Electric Company, and GPU Nuclear Corporation (the licensees), which revised the Technical Specifications (TSs) for operation of the Three Mile Island Nuclear Station, Unit No. 1 (the facility) located in Dauphin County, Pennsylvania. The amendment becomes effective six weeks after its date of issuance.

The amendment revises the TSs for the facility to eliminate use of sodium thiosulfate as a spray additive in the Reactor Building Spray System (RBSS). The amendment also specifies the required sodium hydroxide (NaOH) concentration in the NaOH Tank of the RBSS and the required height differential to be maintained between the Borated Water Storage Tank and the NaOH Tank.

The application for the amendment 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 amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration.

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

For further details with respect to this action, see (1) the application for amendment dated November 23, 1981, as modified and supplemented September 3, 1981, November 23, 1981, August 11, 1982, and January 5, 1983, (2) Amendment No. 80 to License No. DPR-50, 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. 20555, and at the Government Publications Section, State Library of Pennsylvania, Education Building, Commonwealth and Walnut Streets, Harrisburg, Pennsylvania 17126. 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 24th day of February 1983.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz

John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing