October 2, 1997

Mr. James W. Langenbach, Vice President
and Director, TMI
GPU Nuclear Corporation
P.O. Box 480
Middletown, PA 17057

SUBJECT: THREE MILE ISLAND, UNIT 1 - ISSUANCE OF AMENDMENT RE: REDUCING THE TECHNICAL SPECIFICATIONS MAXIMUM ALLOWABLE DOSE EQUIVALENT IODINE-131 LIMIT IN THE REACTOR PRIMARY COOLANT (TAC NO. M99399)

Dear Mr. Langenbach:

The Commission has issued the enclosed Amendment No. 204 to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit No. 1, (TMI-1) in response to your application dated August 14, 1997, as supplemented September 9, 19, and 24, 1997.

The amendment revises the TMI-I Technical Specifications which decreases the maximum allowable dose equivalent iodine-131 limit in the reactor primary coolant from 1.0 uCi/gm to 0.35 uCi/gm.

As described in the enclosure, it is requested that you revise the TMI-1 Updated Final Safety Analysis Report to reflect our findings and include them in your planned submittal on TMI-1 control room habitability.

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,

Original signed by:

Bart C. Buckley, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosures: 1. Amendment No. 204 to DPR-50
2. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION: See attached page

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AMENDMENT NO. 204 TO FACILITY OPERATING LICENSE NO. DPR-50 THREE MILE ISLAND

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Three Mile Island Nuclear Station, Unit No. 1

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WASHINGTON, D.C. 20555-0001

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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. 204
License No. DPR-50

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

   A. The application for amendment by GPU Nuclear Corporation, et al. (the licensee) dated August 14, 1997, as supplemented September 9, 19 and 24, 1997, 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 Appendix A, as revised through Amendment No. 204 , are hereby incorporated in the license. GPU Nuclear Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance, to be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Ronald B. Eaton, Acting Director
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: October 2, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 204

FACILITY OPERATING LICENSE NO. DPR-50

DOCKET NO. 50-289

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

Remove	Insert
3-8	3-8
3-9	3-9
3-9b	3-9b
4-9	4-9

3.1.4 REACTOR COOLANT SYSTEM ACTIVITY

3.1.4.1 LIMITING CONDITION FOR OPERATION

The specific activity of the primary coolant shall be limited to:

a. Less than or equal to 0.35 microcurie/gram DOSE EQUIVALENT I-131, and

b. Less than or equal to $100/\overline{E}$ microcuries/gram*

3.1.4.2 APPLICABILITY: at all times except refueling

3.1.4.3 ACTION:

MODES: Power Operation, Start-Up, Hot Standby

a. With the specific activity of the primary coolant greater than 0.35 microcurie/gram DOSE EQUIVALENT I-131 for more than 48 hours** during one continuous time interval or exceeding the limit line shown on Figure 3.1-2a, be in at least HOT SHUTDOWN within 6 hours. Power operation may continue when DOSE EQUIVALENT I-131 is below 0.35 microcurie/gram.

b. With the specific activity of the primary coolant greater than $100/\overline{E}$ microcuries/gram be in at least HOT SHUTDOWN within 6 hours. Power operation may continue when primary coolant activity is less than $100/\overline{E}$ microcuries/gram.

MODES: At all times except refueling.

c. With the specific activity of the primary coolant greater than 0.35 microcurie/gram DOSE EQUIVALENT I-131 or greater than $100/\overline{E}$ microcuries/gram perform the sampling and analysis requirements of Table 4.1-3 until the specific activity of the primary coolant is restored to within its limits.

Bases

The limitations on the specific activity of the primary coolant ensure that the resulting 2 hour doses at the site boundary will be well within the Part 100 limit following a steam generator tube rupture accident or steam line break accident with postulated accident induced steam generator tube leakage in conjunction with an assumed steady state primary-to-secondary steam generator leakage rate of 1.0 GPM. The values for the limits on specific activity represent limits based on a parametric evaluation by the NRC of typical site locations. These values are conservative, in that the specific site parameters of TMI-1, such as site boundary, location and meteorological conditions, were not considered in this evaluation.

* $\overline{E}$ shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MeV) for isotopes, other than iodines, with half lives greater than 15 minutes, making up at least 95% of the total non-iodine activity in the coolant.

** The time period begins from the time the sample is taken.

The ACTION statement permitting POWER OPERATION to continue for limited time periods with the primary coolant's specific activity greater than 0.35 microcurie/gram DOSE EQUIVALENT I-131, but within the allowable limit shown on Figure 3.1-2a, accommodates possible iodine spiking phenomenon which may occur following changes in THERMAL POWER.

Proceeding to HOT SHUTDOWN prevents the release of activity should a steam generator tube rupture since the saturation pressure of the primary coolant is below the lift pressure of the atmospheric steam relief valves.

The surveillance requirements provide adequate assurance that excessive specific activity levels in the primary coolant will be detected in sufficient time to take corrective action. Information obtained on iodine spiking will be used to assess the parameters associated with spiking phenomena. A reduction in frequency of isotopic analyses following power changes may be permissible if justified by the data obtained.

The NRC staff has performed a generic analysis of airborne radiation released via the Reactor Building Purge Isolation Valves. The dose contribution due to the radiation contained in the air and steam released through the purge isolation valves prior to closure was found to be acceptable provided that the requirements of Specifications 3.1.4.1, 3.1.4.2 and 3.1.4.3 are met.

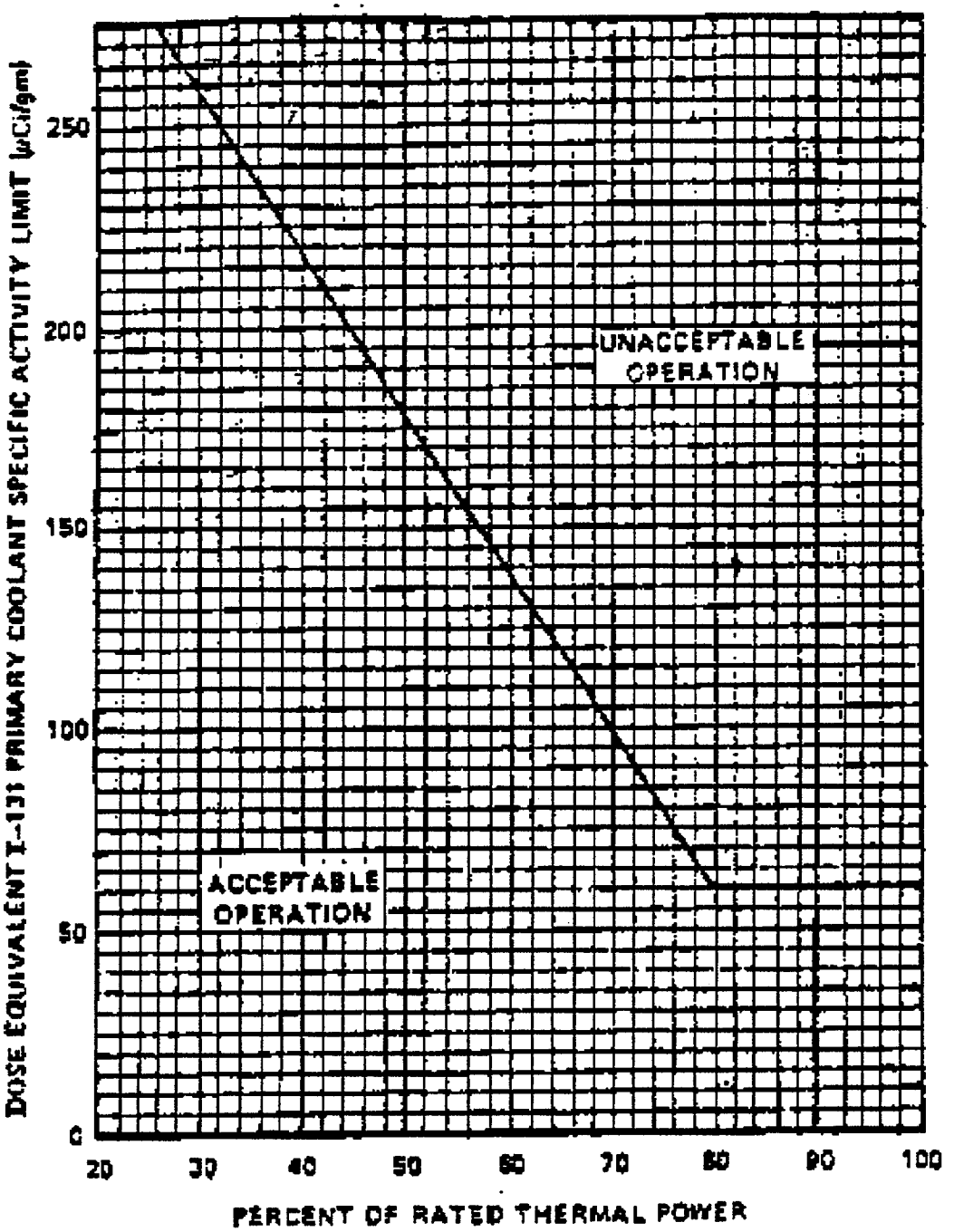

FIGURE 3.1-2a

Dose equivalent I-131 Primary Coolant Specific Activity Limit Versus Percent of RATED THERMAL POWER (with the Primary Coolant Specific Activity >0.35 μCi/gram Dose Equivalent 1-131).

Amendment No. 108, 167, 204

TABLE 4.1-3

MINIMUM SAMPLING FREQUENCY

Item	Check	Frequency
1. Reactor Coolant	a. Specific Activity Determination to compare to the 100/$\bar{E}$ µCi/gm limit	At least once each 72 hours during POWER OPERATION, HOT STANDBY, START-UP, and HOT SHUTDOWN.
	b. Isotopic Analysis for DOSE EQUIVALENT I-131 Concentration	i) 1 per 14 days during power operations. ii) One Sample between 2 and 6 hours following a THERMAL POWER change exceeding 15% of the RATED THERMAL POWER within a one hour period during power operation, start-up and hot standby. iii) # Once per 4 hours, whenever the specific activity exceeds **0.35** µCi/gram DOSE EQUIVALENT I-131 or 100/ $\bar{E}$ µCi/gram during all modes but refueling.
	c. Radiochemical for $\bar{E}$ Determination	1 per 6 months* during power operation
	d. Chemistry (C1, F and 0_2)	5 times/week when T_{avg} is greater than 200°F.
	e. Boron concentration	2 times/week
	f. Tritium Radioactivity	Monthly
2. Borated Water Storage Tank Water Sample	Boron concentration	Weekly and after each makeup when reactor coolant system pressure is greater than 300 psig or T_{avg} is greater than 200°F.
3. Core Flooding Tank Water Sample	Boron concentration	Monthly and after each makeup when RCS pressure is greater than 700 psig.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 204 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 August 14, 1997, as supplemented by letters dated September 9, 19, and 24, 1997, GPU Nuclear, Inc. (the licensee) requested changes to the Technical Specifications (Appendix A to Facility Operating License No. DPR-50) for the Three Mile Island Nuclear Station, Unit 1, (TMI-1/TS) and revisions to the Three Mile Island Unit 1 Updated Final Safety Analysis Report (TMI-1/UFSAR). The requested changes are related to (1) a decrease in the maximum allowable dose equivalent iodine-131 limit in the reactor primary coolant to 0.35 from 1.0 μCi/gm in the TMI-1/TS Section 3.1.4, (2) modifying the caption to reflect the new limit in Figure 3.1.-2a, and (3) revisions to the TMI-1/UFSAR Section 14.1.2, Steam Line Break Accident to address the radiological consequences associated with an increase in the postulated accident-induced steam generator tube leakage. The supplemental letters did not affect the initial no significant hazards consideration determination.

2.0 EVALUATION

The licensee has evaluated the radiological consequences of a postulated steam line break accident associated with an increase in the postulated accident induced steam generator tube leakage in the proposed revisions to the TMI-1/UFSAR. The licensee analyzed this hypothetical accident using (1) 3228 gallons of primary coolant leakage during the first 2 hours of the accident (time dependent leakage integrated over first 2 hours) and 9960 gallons of primary coolant leakage during the course of the accident (integrated over 10 hours), (2) 1.0 μCi/gm of dose equivalent iodine-131 in the reactor primary coolant at the time of accident, (3) iodine partition factors in the TMI-1 once-through steam generator, (4) atmospheric relative concentrations (χ/Q values) at TMI-1 site boundaries in the TMI-1/UFSAR Section 2.5, and (5) new χ/Q values for the control room air intake. The licensee stated that these

radiological consequence assessments meet the relevant dose acceptance criteria; however, the licensee proposed to change the maximum allowable dose equivalent iodine-131 limit in the reactor primary coolant to 0.35 μCi/gm from 1.0 μCi/gm in the TMI-1/TS Section 3.1.4 (and Fig. 3.1-2a) to address the staff's concerns discussed below.

The staff has reviewed the licensee's analysis and finds that the offsite radiological consequence assessments meet the dose acceptance criteria of the Standard Review Plan (applicable criteria are included in Table 1). However, the staff does not agree with the iodine partition factors used by the licensee and the staff did not review the development of the site boundary χ/Q values. Therefore, to check the licensee's calculations and determine the primary coolant radioiodine concentration limit needed to address the staff's concerns, the staff has performed independent radiological consequence calculations for the exclusion area site boundary, low population zone, and control room operator. The staff used (1) 0.35 μCi/gm dose equivalent iodine-131 in the reactor primary coolant at the time of the accident as proposed by the licensee in the TS changes requested, (2) 3228 gallons of integrated primary coolant leakage in the first 2 hours of the accident and 9960 gallons of total integrated primary coolant leakage during the duration of the accident, (3) iodine partition factor of 1.0 in the TMI-1 once-through steam generator (all primary to secondary leakage flashes to steam and released), (4) site boundary atmospheric relative concentrations (χ/Q values) provided in the Safety Evaluation Report for TMI Unit 2 (NUREG-0107 dated September 1976), and (5) new χ/Q values for control room air intake provided by the licensee.

In its radiological consequence assessments, the staff assumed that a temporary increase in the primary coolant iodine concentration (iodine spike) occurred as a result of the power/pressure transient caused by the main steamline break accident. Before the accident, the TMI-1 reactor was assumed to be operating at the TMI-1/TS primary coolant limit of 0.35 μCi/gm dose equivalent iodine-131. The iodine spike generated during the accident is assumed to increase the release rate of iodine from the fuel by a factor of 500. This increase in the release rate results in an increasing iodine concentration in the primary coolant during the course of the accident (accident initiated spike).

The major parameters and assumptions used by the staff are provided in Table 2 and the resulting radiological consequence analyses for the exclusion area boundary, low population zone, and for control room operator are provided in Table 1. With the primary coolant concentration limited to 0.35 uCi/gm dose equivalent iodine-131, the staff concludes that the doses for the main steam line break analysis meet the dose acceptance criteria of the Standard Review Plan.

The NRC staff will evaluate revision to UFSAR Section 14.1.2 at a later date.

3.0 Conclusion

Based on the above evaluation and the calculated radiological consequences shown in Table 1, the staff concludes that the radiological consequences of a postulated main steam line break accident will not exceed a small fraction of

the dose reference values set forth in 10 CFR Part 100 and the control room operator dose acceptance criteria specified in GDC-19 of Appendix A to 10 CFR Part 50. This conclusion is based on TMI Unit 1 reactor operation with the maximum allowable dose equivalent iodine-131 limit of 0.35 μCi/gm in the reactor primary coolant and an integrated primary coolant leakage of up to 3228 gallons during the first 2 hours into the accident, and a total integrated primary coolant leakage of up to 9960 gallons during the course of the steam line break accident. Therefore, the proposed changes to the plant Technical Specifications are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (62 FR 45459). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has 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, (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.

Principal Contributors: Jay Lee
Bart Buckley

Date: October 2, 1997

TABLE 1

Radiological Consequences of Main Steam Line Break Accident
in conjunction with
Accident-Induced Steam Generator Tube Leak
(rem)

	Thyroid	Whole Body
EAB	28	<1
LPZ	5.3	<1
Control Room	29	<1

Note: From the Standard Review Plan, the dose acceptance criteria for the EAB and LPZ are 2.5 rem whole body and 30 rem thyroid for the main steam line break with an accident initiated spike. The criteria for the control room are 5 rem whole body and 30 rem thyroid.

Table 2

Assumptions Used to Calculate Radiological Consequences
Resulting from Main steam Line Accident
in conjunction with
Accident-Induced Steam Generator Tube Leak

Parameter	Value
Reactor Power:	2620 MWt
Primary Coolant Iodine Concentration Limit:	0.35 μCi/gm DE I-131
Iodine Partition Factor in Steam Generator:	1.0
Primary Coolant Volume:	1.124E+4 ft^3
Letdown Flow Rate:	45 gpm
Integrated Primary Coolant Released	
0 to 2 hours	3228 gallons
0 to 10 hours	9960 gallons
Average Leakage Rates (constant rate used)	
0 to 2 hours	26.9 gpm
2 to 10 hours	14.0 gpm
χ/Q Values (sec/m^3)[1]	
0 to 2 hour EAB	8.3E-4[2]
0 to 8 hour LPZ	1.1E-4
8 to 24 hours LPZ	6.7E-5
1 to 4 days LPZ	2.5E-5
4 to 30 days LPZ	6.0E-6
Control Room Pressure Boundary Volume:	1.26E+5 ft
Control Room Air Recirculation Rate:	3.9E+4 cfm
Control Room Unfiltered Inleakage Rate:	2.628E+3 cfm
Emergency Filtration Filter Efficiencies:	90%
Control Room Makeup Air Inlet	3.0E+3 cfm
Control Room χ/Q Values (sec/m^3)	
0 to 8 hours	7.45E-3
8 to 24 hours	4.15E-3
1 to 4 days	2.73E-3
4 to 30 days	1.44E-3

(1) NUREG-0107, Safety Evaluation Report for TMI Unit No. 2 (September 1976)
(2) NRC Fuel Handling Accident Safety Evaluation (December 1979)