Docket No. 50-220

June 10, 1986

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Niagara Mohawk Power Corporation
Attn: Mr. C. V. Mangan
Senior Vice President
c/o Miss Catherine R. Seibert
300 Erie Boulevard West
Syracuse, New York 13202

Dear Mr. Mangan:

SUBJECT: LIMITS FOR MINIMUM REACTOR VESSEL TEMPERATURE FOR PRESSURIZATION (TAC 60585)

Re: Nine Mile Point Nuclear Station, Unit No. 1

The Commission has issued the enclosed Amendment No. 85 to Facility Operating License No. DPR-63 for the Nine Mile Point Nuclear Station, Unit No. 1. This amendment is in response to your application dated January 28, 1986. The amendment modifies the Technical Specifications (TS) to: (1) reflect a change in the limits for minimum reactor vessel temperature for pressurization, and (2) delete the operating limits for hydrostatic testing with the reactor critical.

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

Sincerely,

/S/

John A. Zwolinski, Director
BWR Project Directorate #1
Division of BWR Licensing

Enclosures:
1. Amendment No. 85 to License No. DPR-63
2. Safety Evaluation

cc w/enclosures:
See next page

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Mr. C. V. Mangan
Niagara Mohawk Power Corporation

Nine Mile Point Nuclear Station,
Unit No. 1

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

NIAGARA MOHAWK POWER CORPORATION

DOCKET NO. 50-220

NINE MILE POINT NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 85
License No. DPR-63

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

   A. The application for amendment by Niagara Mohawk Power Corporation (the licensee) dated January 28, 1986, 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-63 is hereby amended to read as follows:

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(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 85 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION

John A. Zwolinski, Director
BWR Project Directorate #1
Division of BWR Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 10, 1986

ATTACHMENT TO LICENSE AMENDMENT NO. 85

FACILITY OPERATING LICENSE NO. DPR-63

DOCKET NO. 50-220

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
77	77
78	78
79	79
79a	79a
80	80
80a	80a
81	81
81a	81a
82	82
82a	--
82b	--

LIMITING CONDITION FOR OPERATION

3.2.2 MINIMUM REACTOR VESSEL TEMPERATURE FOR PRESSURIZATION

Applicability:

Applies to the minimum vessel temperature required for vessel pressurization.

Objective:

To assure that no substantial pressure is imposed on the reactor vessel unless its temperature is considerably above its Nil Ductility Transition Temperature (NDTT).

Specification:

a. During reactor vessel heatup and cooldown when the reactor is not critical, the reactor vessel temperature and pressure shall satisfy the requirements of Figure 3.2.2.a.

b. During reactor vessel heatup and cooldown when the reactor is critical, the reactor vessel temperature and pressure shall satisfy the requirements of Figure 3.2.2.b. except when performing low power physics testing with the vessel head removed at power levels not to exceed 5 mw(t).

SURVEILLANCE REQUIREMENT

4.2.2 MINIMUM REACTOR VESSEL TEMPERATURE FOR PRESSURIZATION

Applicability:

Applies to the required vessel temperature for pressurization.

Objective:

To assure that the vessel is not subjected to any substantial pressure unless its temperature is greater than its Nil Ductility Transition Temperature (NDTT).

Specification:

a. Reactor vessel temperature and pressure shall be monitored and controlled to assure that the pressure and temperature limits are met.

b. Vessel material and surveillance samples located within the core region to permit periodic monitoring of exposure and material properties shall be inspected on the following schedule:

First capsule - one fourth service life
Second capsule - three fourth service life
Third capsule - standby

In the event the surveillance specimens at one quarter of the vessels service life indicate a shift of reference temperature greater than predicted the schedule shall be revised as follows:

Second capsule - one half service life
Third capsule - standby

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
c. During hydrostatic testing, the reactor vessel temperature and pressure shall satisfy the requirements of Figure 3.2.2.c. if the core is not critical.	
d. The reactor vessel head bolting studs shall not be under tension unless the temperature of the vessel head flange and the head are equal to or greater than 100F.	

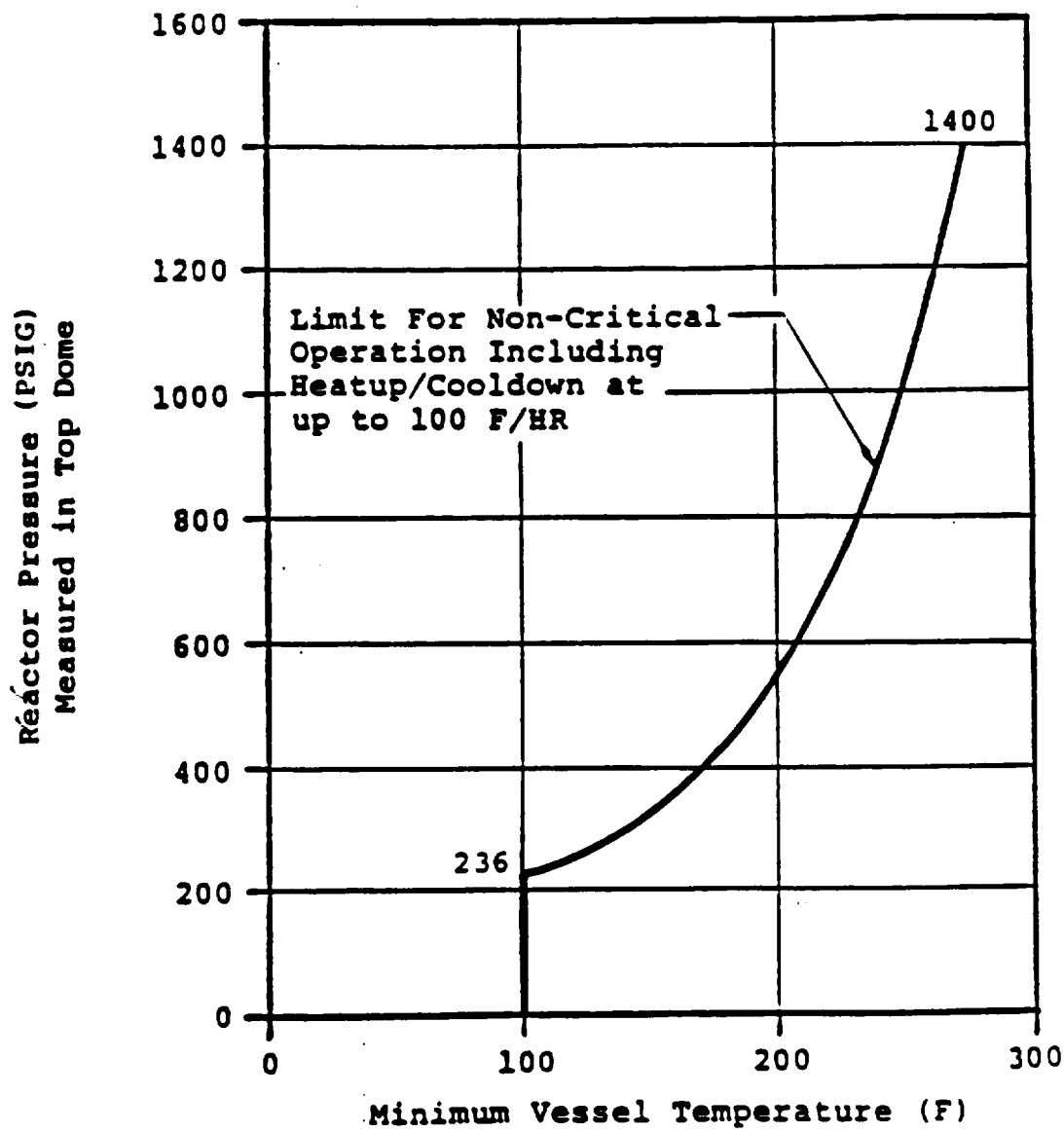

FIGURE 3.2.2.a

MINIMUM TEMPERATURE FOR PRESSURIZATION DURING HEATUP OR COOLDOWN (REACTOR NOT CRITICAL) (HEATING OR COOLING RATE ≤ 100 F/HR) FOR UP TO ELEVEN EFFECTIVE FULL POWER YEARS OF CORE OPERATION

LIMIT FOR NON-CRITICAL OPERATION
INCLUDING HEAT-UP/COOLDOWN AT
UP TO 100F/HR

PRESSURE (psig)	TEMPERATURE (F)
236	100
300	135
350	154
400	170
450	182
500	192
550	201
600	209
650	217
700	223
750	229
800	234
850	240
900	244
950	248
1000	253
1050	256
1100	260
1150	263
1200	267
1300	273
1400	279

TABLE 3.2.2.a

MINIMUM TEMPERATURE FOR PRESSURIZATION DURING
HEAT-UP OR COOLDOWN (REACTOR NOT CRITICAL)
(HEATING OR COOLING RATE 100F/HR)
FOR UP TO ELEVEN EFFECTIVE FULL
POWER YEARS OF CORE OPERATION

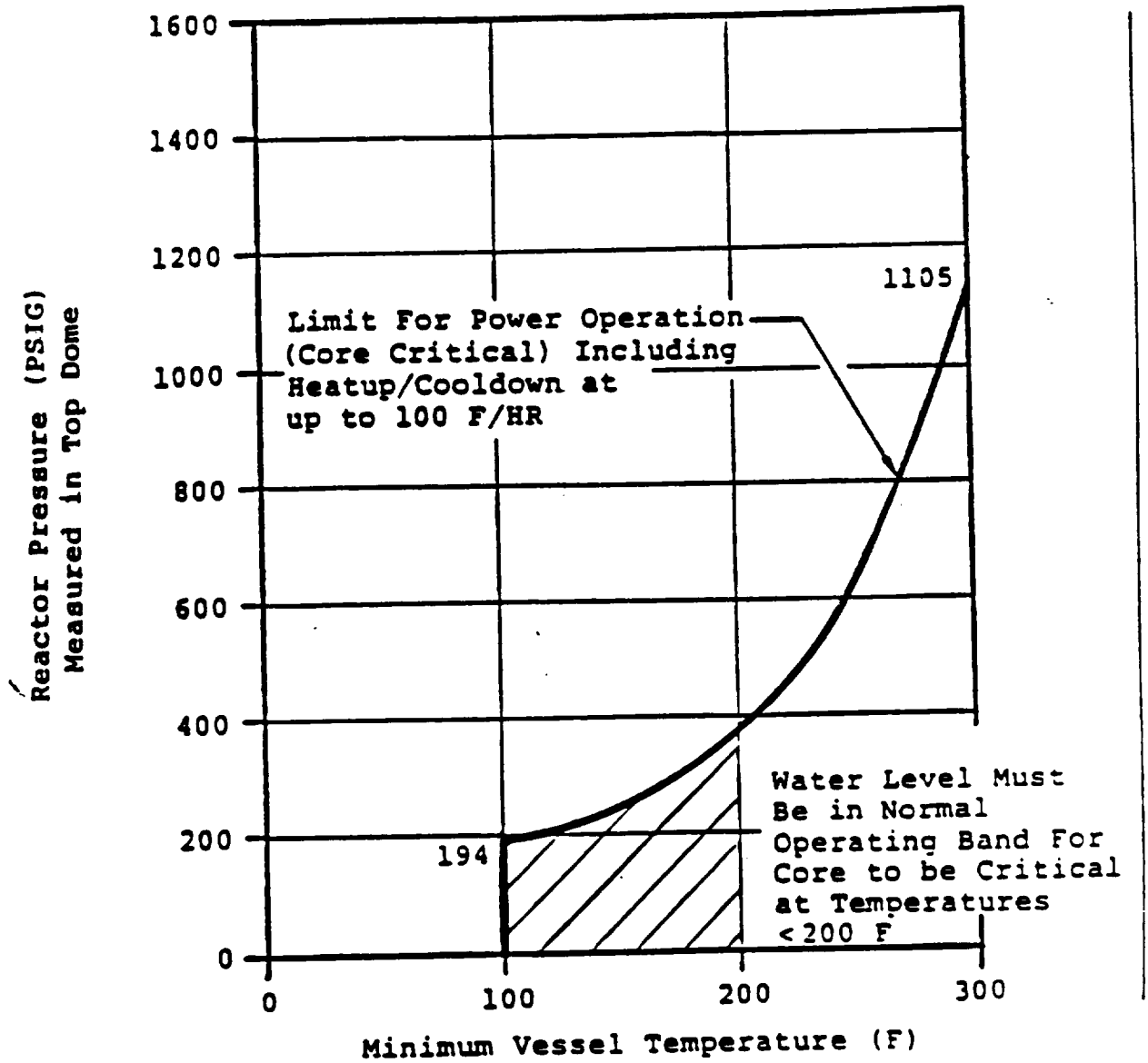

FIGURE 3.2.2.b

MINIMUM TEMPERATURE FOR PRESSURIZATION DURING HEATUP OR COOLDOWN (REACTOR CRITICAL) (HEATING OR COOLING RATE ≤ 100 F/HR) FOR UP TO ELEVEN EFFECTIVE FULL POWER YEARS OF CORE OPERATION

LIMIT FOR POWER OPERATION
(CORE CRITICAL) INCLUDING HEAT-UP/
COOLDOWN AT UP TO 100F/HR

PRESSURE (psig)	TEMPERATURE (F)
194	100
250	150
300	176
350	194
400	210
450	222
500	232
550	241
600	249
650	257
700	263
750	269
800	274
850	280
900	284
950	288
1000	293
1050	296
1100	300
1150	303
1200	307
1300	313
1400	319

TABLE 3.2.2.b

MINIMUM TEMPERATURE FOR PRESSURIZATION DURING
HEAT-UP OR COOLDOWN (REACTOR CRITICAL)
(HEATING OR COOLING RATE 100F/HR)
FOR UP TO ELEVEN EFFECTIVE FULL
POWER YEARS OF CORE OPERATION

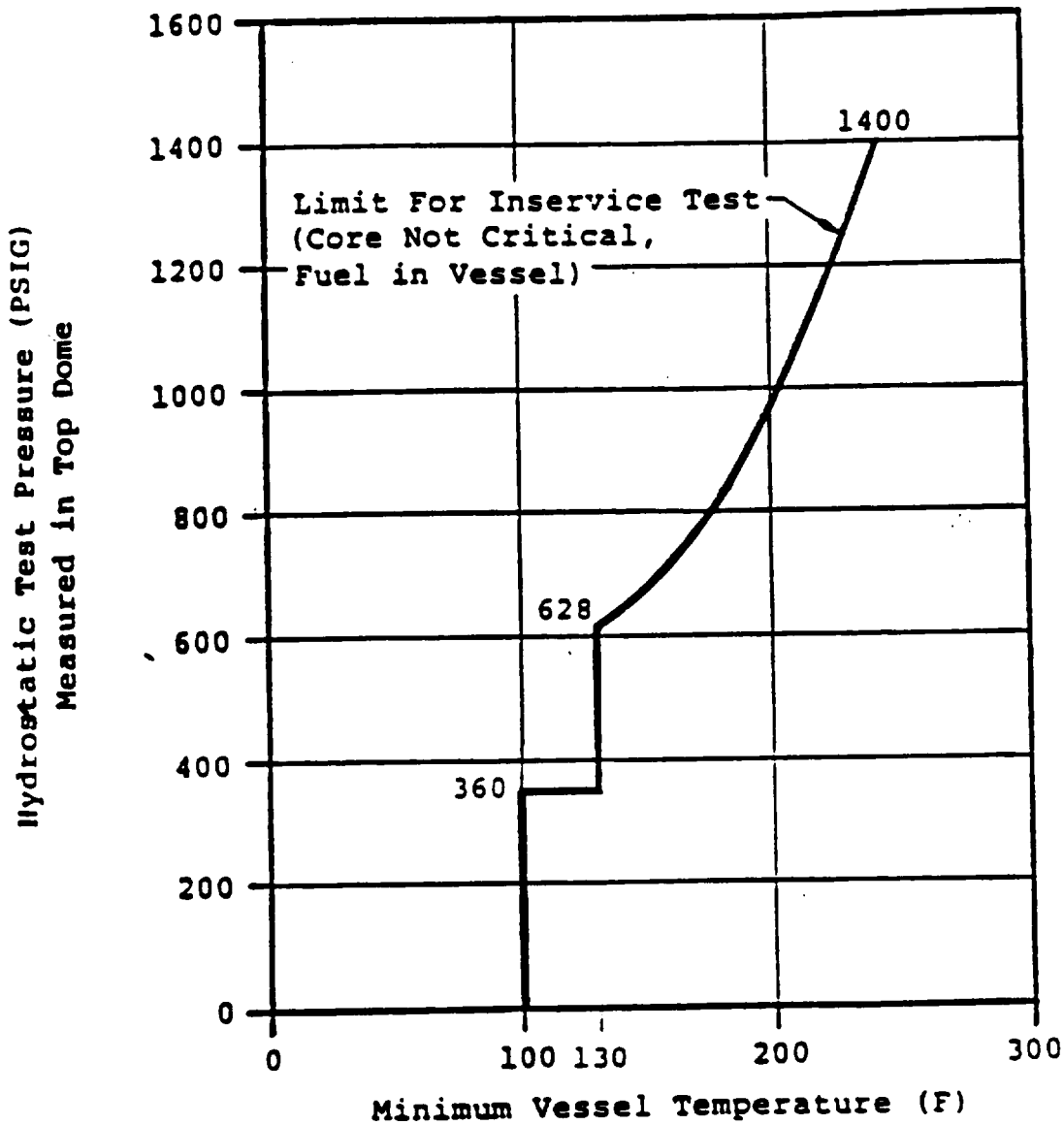

FIGURE 3.2.2.c

MINIMUM TEMPERATURE FOR PRESSURIZATION DURING HYDROSTATIC TESTING (REACTOR NOT CRITICAL) FOR UP TO ELEVEN EFFECTIVE FULL POWER YEARS OF CORE OPERATION

LIMIT FOR IN-SERVICE TEST
(CORE NOT CRITICAL, FUEL IN VESSEL)

PRESSURE (psig)	TEMPERATURE (F)
360	100-130
628	130
700	152
800	174
900	190
1000	204
1050	210
1100	215
1150	220
1200	225
1300	233
1400	241

TABLE 3.2.2.c

MINIMUM TEMPERATURE FOR PRESSURIZATION DURING HYDROSTATIC TESTING (REACTOR NOT CRITICAL) FOR UP TO ELEVEN EFFECTIVE FULL POWER YEARS OF CORE OPERATION

BASES FOR 3.2.2 AND 4.2.2 MINIMUM REACTOR VESSEL TEMPERATURE FOR PRESSURIZATION

Figures 3.2.2.a and 3.2.2.b are plots of pressure versus temperature for a heat-up and cool down rate of 100F/hr. maximum. (Specification 3.2.1). Figure 3.2.2.c is a plot of pressure versus temperature for hydrostatic testing. These curves are based on calculations of stress intensity factors according to Appendix G of Section III of the ASME Boiler and Pressure Vessel Code 1980 Edition with Winter 1982 Addenda. In addition, temperature shifts due to integrated neutron flux at eleven effective full power years of operation were incorporated into the figures. These shifts were calculated from the formula presented in Regulatory Guide 1.99, proposed Revision 2. These curves are applicable to the beltline region at low and elevated temperatures and the vessel flange at intermediate temperatures. Reactor vessel flange/reactor head flange boltup is governed by other criteria as stated in Specification 3.2.2.d. The pressure readings on the figures have been adjusted to reflect the calculated elevation head difference between the pressure sensing instrument locations and the pressure sensitive area of the core beltline region.

The reactor vessel head flange and vessel flange in combination with the double "O" ring type seal are designed to provide a leak-tight seal when bolted together. When the vessel head is placed on the reactor vessel, only that portion of the head flange near the inside of the vessel rests on the vessel flange. As the head bolts are replaced and tensioned, the vessel head is flexed slightly to bring together the entire contact surfaces adjacent to the "O" rings of the head and vessel flange. Both the head and vessel and flange have a NDT temperature of 40F and they are not subject to any appreciable neutron radiation exposure. Therefore, the minimum vessel head and head flange temperature for bolting the head flange and vessel flange is established as 40 + 60F or 100F.

Figures 3.2.2.a., 3.2.2.b. and 3.2.2.c. have incorporated a temperature shift due to the calculated integrated neutron flux. The integrated neutron flux at the vessel wall is calculated from core physics data and has been measured using flux monitors installed inside the vessel. The curves are applicable for up to eleven effective full power years of operation.

Vessel material surveillance samples are located within the core region to permit periodic monitoring of exposure and material properties relative to control samples. The material sample program conforms with ASTM E185-66 except for the material withdrawal schedule which is specified in Specification 4.2.2.b.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 85 TO FACILITY OPERATING LICENSE NO. DPR-63

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-220

1.0 INTRODUCTION

By application dated January 28, 1986, Niagara Mohawk Power Corporation (the licensee) requested an amendment to Appendix A of Facility Operating License No. DPR-63 for the Nine Mile Point Nuclear Station, Unit No. 1 (NMP-1). The amendment would modify the Technical Specifications (TS) to: (1) reflect a change in the limits for minimum reactor vessel temperature for pressurization, and (2) delete the operating limits for hydrostatic testing with the reactor critical.

Three surveillance capsules were installed in the NMP-1 reactor vessel prior to startup in 1969. Two surveillance capsules have been removed from the NMP-1 reactor vessel to date. The A capsule was removed in 1979 after a vessel exposure of 5.8 effective full power years (efpy) and the C capsule was removed in 1982 after a vessel exposure of 7.98 efpy. The requested revision to the pressure-temperature curves reflects changes in reactor vessel materials property due to irradiation embrittlement. This revision is required to meet safety margins of Appendix G, 10 CFR Part 50, which requires the licensee to perform periodic testing of reactor vessel material samples placed inside of the reactor vessel in order to monitor neutron irradiation embrittlement. The three capsules installed at NMP-1 contain Charpy and tensile mechanical property test specimens, along with iron, copper and nickel dosimeter wires.

2.0 EVALUATION

The C capsule is of primary interest and is located at 300-degree azimuth; and the A capsule is located at 30-degree azimuth. The samples in both capsules represent base metal, weld metal and heat affected zone (HAZ) metals. The licensee performed the following tests for the specimens that were removed from the capsules:

(1) Charpy impact tests: the data generated from these tests was used to construct the Charpy transition curves and to determine the upper shelf energy level of reactor vessel materials. The data included test temperature, energy absorbed by the specimen in breaking, lateral expansion, percent ductile fracture, 30 ft-lb level nil-ductility temperature (NDT) and 50 ft-lb level NDT temperature. The Charpy impact data were prepared and reported according to ASTM E 185-82 and the results are within the minimum allowable specified in 10 CFR Part 50 Appendix G.

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(2) Tensile tests: The tensile tests were conducted to determine the tensile properties of metals; e.g., yield strength, ultimate tensile strength, uniform elongation, total elongation, fracture strength, fracture stress, and reduction in area.

(3) Chemical analysis: The weld metal and base metal specimen were analyzed to determine percentage weight of copper, phosphorus, and nickel, using the method of x-ray fluorescence. The following is the average chemical composition of the specimens.

	copper	nickel	phosphorus
Base metal	0.25%	0.52%	0.041%
Weld metal	0.17%	0.07%	0.022%

The chemical contents of these elements are needed to calculate nil-ductility reference temperature (RT_{NDT}).

(4) Neutron dosimetry measurements: This task used a germanium detector to measure specific activities of flux monitor wires in the surveillance capsule. The gamma radiation from the dosimeter was measured and used to calculate the neutron fluence. The capsule specimens received a fast neutron fluence of $4 \sim 5 \times 10^{17}$ n/cm^2 at E > 1 MeV. This neutron fluence is comparable to those of other BWR vessels for the period of 5-8 efpy.

Using Regulatory Guide 1.99, Revision 2 the licensee calculated the shifted RT_{NDT} based on the amount of neutron fluence, and the percentage weight of copper and nickel in the material and compared the results to the shifts which resulted from the surveillance test data. Based on the test results, the pressure-temperature limits were obtained using the reference stress intensity factor vs. temperature relation as discussed in Appendix G of the ASME Code. In evaluating the licensee's calculation, the staff used procedures in SRP 5.3.2 and Regulatory Guide 1.99, Revision 2 to determine the acceptability of the RT_{NDT} shift and pressure-temperture limits. The staff found the licensee's pressure-temperature limits acceptable for 11 efpy of core operation.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this 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 nor environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The staff 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, and (2) 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 nor to the health and safety of the public.

Principal Contributor: J. Tsao

Dated: June 10, 1986