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Docket No. 50-219

OCT 16 1979

Mr. I. R. Finfrock, Jr.
Vice President - Generation
Jersey Central Power & Light Company
Madison Avenue At Punch Bowl Road
Morristown, New Jersey 07960

Dear Mr. Finfrock:

The Commission has issued the enclosed Amendment No. 42 to Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station. The amendment consists of changes to the Appendix A Technical Specifications in response to your request dated October 3, 1979, which supersedes your application dated January 9, 1975.

The amendment modifies the provisions of the Appendix A Technical Specifications to assure that the pressure-temperature limits of the reactor coolant system are in conformance with 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements".

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

Sincerely,

Original signed by
Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosures:
1. Amendment No. 42 to License No. DPR-16
2. Safety Evaluation
3. Notice of Issuance

cc w/enclosure:
See next page

CP

CCP

OFFICE	DOR:ORB #2	DOR:ORB #2	OELD	DOR:ORB #2	DOR:A/AD/SEP	
SURNAME	HSmith:ah	SJNowicki		DLZiemann	RHVollmer	
DATE	10/9/79	10/9/79	10/12/79	10/15/79	10/15/79	

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

October 16, 1979

Docket No. 50-219

Mr. I. R. Finfrock, Jr.
Vice President - Generation
Jersey Central Power & Light Company
Madison Avenue At Punch Bowl Road
Morristown, New Jersey 07960

Dear Mr. Finfrock:

The Commission has issued the enclosed Amendment No. 42 to Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station. The amendment consists of changes to the Appendix A Technical Specifications in response to your request dated October 3, 1979, which supersedes your application dated January 9, 1975.

The amendment modifies the provisions of the Appendix A Technical Specifications to assure that the pressure-temperature limits of the reactor coolant system are in conformance with 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements".

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

Sincerely,

Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosures:
1. Amendment No. 42 to License No. DPR-16
2. Safety Evaluation
3. Notice of Issuance

cc w/enclosure:
See next page

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

JERSEY CENTRAL POWER & LIGHT COMPANY

DOCKET NO. 50-219

OYSTER CREEK NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No. 42
License No. DPR-16

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

   A. The application for amendment by Jersey Central Power & Light Company (the licensee) dated October 3, 1979, 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 3.B of Provisional Operating License No. DPR-16 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 42, 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

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 16, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 42

PROVISIONAL OPERATING LICENSE NO. DPR-16

DOCKET NO. 50-219

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

PAGES
3.3-1
3.3-2
3.3-2a
3.3-3*
3.3-6
3.3-7

*There were no changes made to this page. The Technical Specification provisions have merely been repositioned.

3.3 REACTOR COOLANT

Applicability: Applies to the operating status of the reactor coolant system.

Objective: To assure the structure integrity of the reactor coolant system.

Specification:

A. Pressure Temperature Relationships

(i) Hydrostatic Leakage Tests - the minimum reactor vessel temperature for hydrostatic leakage tests at a given pressure shall be in excess of that indicated by Curve A of Figure 3.3.1.

(ii) Heatup and Cooldown Operations: Reactor non-critical--the minimum reactor vessel temperature for heatup and cooldown operations at a given pressure when the reactor is not critical shall be in excess of that indicated by Curve B of Figure 3.3.1.

(iii) Power operations--The minimum reactor vessel temperature for power operations at a given pressure shall be in excess of that indicated by Curve C of Figure 3.3.1.

(iv) Appropriate new pressure temperature limits must be approved as part of this Technical Specification when the reactor system has reached ten effective full power years of reactor operation.

B. Reactor Vessel Closure Head Boltdown

The reactor vessel closure head studs may be elongated by .020" (1/3 design preload) with no restrictions on reactor vessel temperature as long as the reactor vessel is at atmospheric pressure. Full tensioning of the studs is not permitted unless the temperature of the reactor vessel flange and closure head flange is in excess of 100°F.

C. Thermal Transients

1. The average rate of reactor coolant temperature change during normal heatup and cooldown shall not exceed 100°F in any one hour period.

2. The pump in an idle recirculation loop shall not be started unless the temperature of the coolant within the idle recirculation loop is within 50°F of the reactor coolant temperature.

D. Reactor Coolant System Leakage

Reactor coolant leakage into the primary containment from unidentified sources shall not exceed 5 gpm. In addition, the total leakage in the containment, identified and unidentified, shall not exceed 25 gpm. If these conditions cannot be met, the reactor will be placed in the cold shutdown condition.

E. Reactor Coolant Quality

1. The reactor coolant quality shall not exceed the following limits during power operation with steaming rates to the turbine-condenser of less than 100,000 pounds per hour.

conductivity	2 μ mho/cm
chloride ion	0.1 ppm

2. The reactor coolant quality shall not exceed the following limits during power operation with steaming rates to the turbine-condenser of at least 100,000 pounds per hour.

conductivity	10 mho/cm
chloride ion	1.0 ppm

3. If Specification 3.3.E.1 and 3.3.E.2 cannot be met, the reactor shall be placed in the cold shutdown condition.

F. Recirculation Loop Operability

1. The reactor shall not be operated with one or more recirculation loops out of service except as specified in Specification 3.3.F.2.

2. Reactor operation with one idle recirculation loop is permitted provided that the idle loop is not isolated from the reactor vessel.

3. If Specifications 3.3.F.1 and 3.3.F.2 are not met the reactor shall be placed in the cold shutdown condition within 24 hours.

Bases:

The reactor coolant system[(1)] is a primary barrier against the release of fission products to the environs. In order to provide assurance that this barrier is maintained at a high degree of integrity, restrictions have been placed on the operating conditions to which it can be subjected.

The Oyster Creek reactor vessel was designed and manufactured in accordance with General Electric Specification 21A1105 and ASME Section I as discussed in Reference 13. The original operating limitations were based upon the requirement that the minimum temperature for pressurization be at

least 60°F greater than the nil ductility transformation temperature. The minimum temperature for pressurization at any time in life had to account for the toughness properties in the most limiting regions of the reactor vessel, as well as the effects of fast neutron embrittlement.

Figures 3.3.1 is derived from an evaluation of the fracture toughness properties performed for Oyster Creek. (Reference 12) in an effort to establish new operating limits. The results of neutron flux dosimeter analyses in Reference 12 indicate that the total fast neutron fluence (>1 Mev) expected for Oyster Creek at the end of ten effective full power years of operation is 1.22×10^{18} nvt on the inside surface of the reactor vessel core region shell. A conservative fast neutron fluence of 75% of this value is assumed at the 1/4 T (one quarter of wall thickness) location for the preparation of the pressure/temperature curves in Figure 3.3.1.

Stud tensioning is considered significant from the standpoint of brittle fracture only when the preload exceed approximately 1/3 of the final design value. No vessel or closure stud minimum temperature requirements are considered necessary for preload values below 1/3 of the design preload with the vessel depressurized since preloads below 1/3 of the design preload result in vessel closure and average bolt stresses which are less than 20% of the yield strengths of the vessel and bolting materials. Extensive service experience with these materials has confirmed that the probability of brittle fracture is extremely remote at these low stress levels, irrespective of the metal temperature.

The reactor vessel head flange and the 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 the head flange have an NDT temperature of $40^{\circ}F$, 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 $40^{\circ}F + 60^{\circ}F$ or $100^{\circ}F$.

Detailed stress analyses[4] were made on the reactor vessel for both steady state and transient conditions with respect to material fatigue. The results of these analyses are presented and compared to allowable stress limits in Reference (4). The specific conditions analyzed included 120 cycles of normal startup and shutdown with a heating and cooling rate of $100^{\circ}F$ per hour applied continuously over a temperature range of $100^{\circ}F$ to $546^{\circ}F$ and for 10 cycles of emergency cooldown at a rate of $300^{\circ}F$ per hour applied over the same range. Thermal stresses from this analysis combined with the primary load stresses fall within ASME Code Section III allowable stress intensities. Although the Oyster Creek Unit 1 reactor vessel was built in accordance with Section I of the ASME Code, the design criteria included in the reactor vessel specifications were in essential agreement with the criteria subsequently incorporated into Section III of the Code.[6]

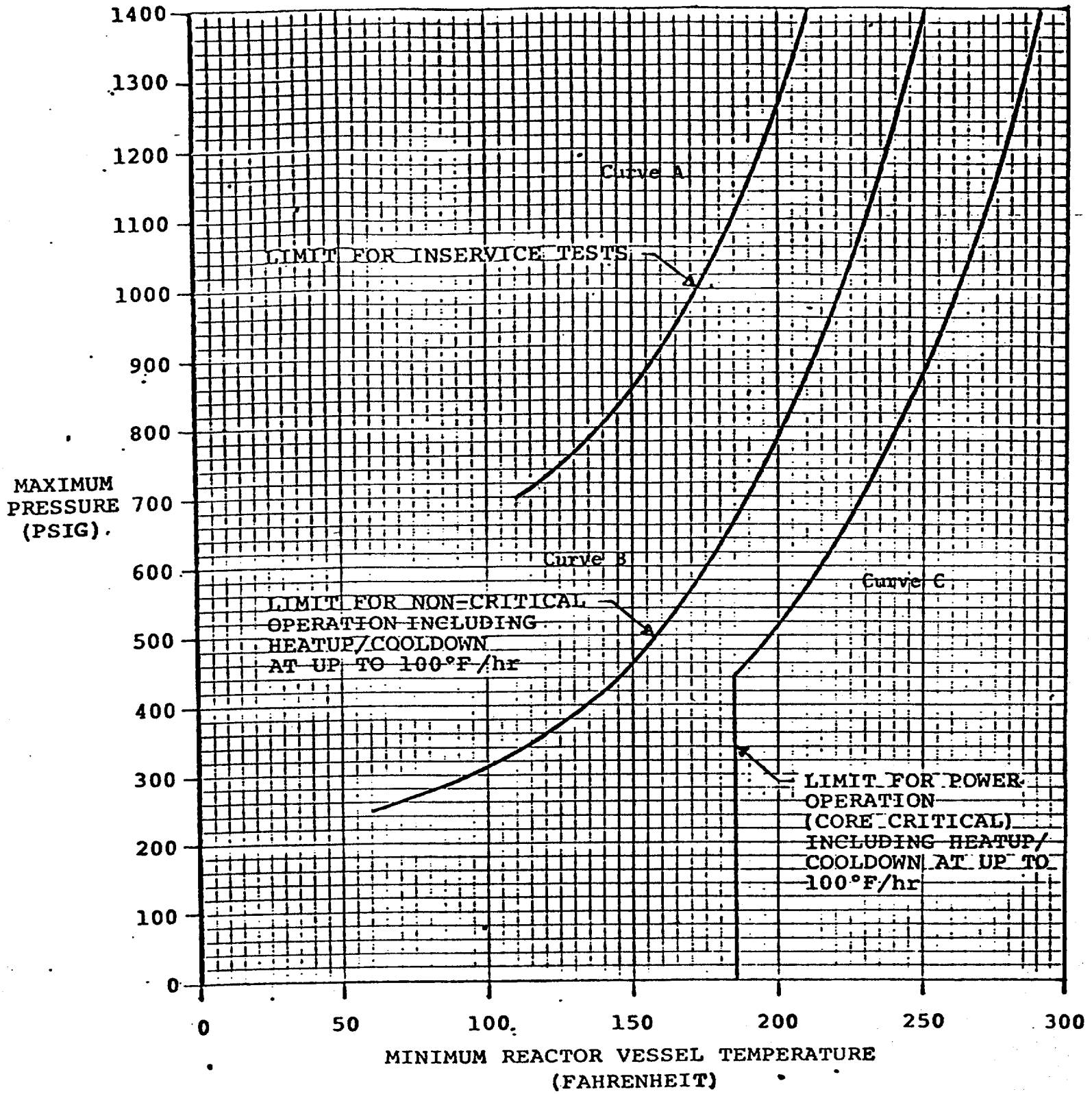
Chloride stress corrosion tests on stressed 304 stainless steel specimens have been reported [11]. According to the data, allowable chloride concentrations could be set over an order of magnitude higher than the established limit of 1.0 ppm at the oxygen concentration (0.2-0.3 ppm) that will be present during power operation. Oxygen is maintained at low levels by the turbine-condenser off-gas system. Zircaloy does not exhibit similar stress corrosion failures.

Air saturated water (7 ppm oxygen) is pumped into the reactor as a result of operation of the control rod drive system. Therefore, the oxygen level in the reactor water can be higher than 0.2-0.3 ppm during startups or during periods of hot standby when the reactor is not steaming at significant powers, and a more stringent limit of 0.1 ppm chloride has been established for these periods to insure that the combination of chloride and oxygen will always be well below stress corrosion failure limits [11]. At reactor steaming rates of at least 100,000 pounds per hour boiling occurs in the reactor causing deaeration of the reactor water which maintains oxygen below operating levels.

In the case of BWR's where no additives are used in the primary coolant, and where neutral pH is maintained, conductivity provides a very good measure of the quality of the reactor water. When the conductivity is within its proper normal range, pH, chloride, and other impurities affecting conductivity and water quality must also be within their normal ranges. Significant changes in conductivity provide the operator with a warning mechanism so that he can investigate and remedy the conditions causing the change. Measurements of pH, chloride, and other chemical parameters are made to determine the cause of the unusual conductivity and instigate proper corrective action. These can be done before limiting conditions, with respect to variables affecting the boundaries of the reactor coolant, are exceeded. Several techniques are available to correct off-standard reactor water quality conditions including removal of impurities from reactor water by the cleanup system, reducing input of impurities causing off-standard conditions by reducing power and placing the reactor in the cold shutdown condition. The major benefit of cold shutdown is to reduce the temperature dependent corrosion rates and thereby provide time for the cleanup system to re-establish proper water quality.

References

(1) FDSAR, Volume I, Section IV-2
(2) (Deleted)
(3) (Deleted)
(4) Licensing Application Amendment 16, Design Requirements Section
(5) (Deleted)
(6) FDSAR, Volume I, Section IV-2.3.3 and Volume II, Appendix H
(7) FDSAR, Volume I, Table IV-2-1
(8) Licensing Application Amendment 34, Question 14
(9) Licensing Application Amendment 28, Item III-B-2
(10) Licensing Application Amendment 32, Question 15
(11) Licensing Application Amendment 11, Question VI-4
(12) Licensing Application Amendment 68, Supplement No. 6, Addendum No. 3
(13) Licensing Application Amendment 16, Page 1



OYSTER CREEK NUCLEAR GENERATING STATION REACTOR VESSEL
PRESSURE/TEMPERATURE LIMITS
FOR UP TO TEN EFFECTIVE FULL POWER YEARS OF CORE OPERATION

Figure 3.3.1

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 42 TO PROVISIONAL OPERATING LICENSE NO. DPR-16

JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 Introduction

By letter dated October 3, 1979, which supersedes letter dated January 9, 1975, Jersey Central Power & Light Company (JCPL) submitted an application for an amendment to the Appendix A Technical Specifications appended to Provisional Operating License DPR-16 for Oyster Creek. The requested changes would modify the reactor coolant system pressure-temperature limits to account for increases in the reactor vessel metal reference nilducility temperature (RT_{NDT}) due to irradiation.

2.0 Discussion

10 CFR Part 50, Appendix G, "Fracture Toughness Requirements," requires that pressure temperature limits be established for reactor coolant system heatup and cooldown operations, inservice leak and hydrostatic tests, and reactor core operation. These limits are required to ensure that the stresses in the reactor vessel remain within acceptable limits. They are intended to provide adequate margins of safety during any condition of normal operation, including anticipated operational transients.

The pressure-temperature limits depend upon the metallurgical properties of the reactor vessel materials. The properties of materials in the vessel beltline region vary over the lifetime of the vessel because of the effects of neutron irradiation. One principle effect of the neutron irradiation is that it causes RT_{NDT} to increase with time. The pressure-temperature operating limits must be modified periodically to account for this radiation induced increase in RT_{NDT} by increasing the temperature required for a given pressure. The operating limits for a particular operating period are based on the material properties at the end of the operating period. By periodically revising the pressure-temperature limits to account for radiation damage, the stresses and stress intensities in the reactor vessel can be held within acceptable limits. At the beginning of life, material other than that in the beltline region may be the limiting material because it is subjected to high stresses and stress intensities. However, since material outside the beltline region is not subjected to high level irradiation, its RT_{NDT} will not change as the beltline region will and at some period of life, the beltline materials will become limiting.

The magnitude of the shift in RT_{NDT} is proportional to the neutron fluence to which the materials are exposed. The shift in RT_{NDT} can be predicted from the results of tests on material surveillance specimens or from the guidance contained in Regulatory Guide 1.99.

3.0 Evaluation

The revised operating limits are based on the calculational methods contained in ASME Code, Section III and Appendix G to 10 CFR Part 50. The operating limits are proposed for operation through 10 Effective Full Power Years (EFPY). The fluence predicted on the vessel wall at 10 EFPY is based on an end of life fluence value on the vessel wall ID of 3.3×10^{18} n/cm^2. The amount of radiation damage, increase in RT_{NDT}, resulting from this fluence is estimated from the guidance contained in Regulatory Guide 1.99, Revision 1. Weld metal, having a copper content of 0.27%, was found to be the limiting material.

We have reviewed the proposed changes to Sections 3.3.A, 3.3.B, the bases, references and the proposed pressure-temperature operating limits for Oyster Creek and have performed independent calculations to verify compliance with Appendix G. We conclude that the proposed operating limits are in accordance with Appendix G, 10 CFR Part 50 for operation through 10 EFPY and are therefore acceptable for this operating period. Conformance with Appendix G to 10 CFR Part 50 in establishing safety operating limitations will ensure adequate safety margins during operation, testing, maintenance and postulated accident conditions and constitutes an acceptable basis for satisfying the requirements to NRC General Design Criterion 31, Appendix A, 10 CFR Part 50. We, therefore, find the proposed amendment to the Technical Specifications acceptable.

4.0 Environmental Consideration

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.

5.0 Conclusion

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 accidents previously considered and does not involve a significant decrease in a safety margin, 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.

Date: October 16, 1979

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-219

JERSEY CENTRAL POWER & LIGHT COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO PROVISIONAL OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 42 to Provisional Operating License No. DPR-16, issued to Jersey Central Power & Light Company (the licensee), which revised the Technical Specifications for operation of the Oyster Creek Nuclear Generating Station (the facility) located in Ocean County, New Jersey. The amendment is effective as of its date of issuance.

The amendment modifies the provisions of the Appendix A Technical Specifications to assure that the pressure-temperature limits of the reactor coolant system are in conformance with 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements".

The application for 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 applications for amendment dated January 9, 1975 and October 3, 1979, (2) Amendment No. 42 to License No. DPR-16, and (3) the Commission's related Safety Evaluation. All of these are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D. C., and at the Ocean County Library, Brick Township Branch, 401 Chambers Bridge Road, Brick Town, New Jersey 08723. 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 Operating Reactors.

Dated at Bethesda, Maryland, this 16th day of October, 1979.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors