May 28, 1986

Docket No. 50-293

Mr. William D. Harrington
Senior Vice President, Nuclear
Boston Edison Company
800 Boylston Street
Boston, Massachusetts 02199

Dear Mr. Harrington:

SUBJECT: REACTOR PRESSURE VESSEL PRESSURE-TEMPERATURE LIMITS (TAC 60938)

Re: Pilgrim Nuclear Power Station

The Commission has issued the enclosed Amendment No. 94 to Facility Operating License No. DPR-35 for the Pilgrim Nuclear Power Station. This amendment is in response to your application dated

The amendment changes the pressure-temperature limit curves on Technical Specification Figures 3.6.1 and 3.6.2 to more accurately reflect the neutron exposure of the reactor pressure vessel during operation of the Pilgrim Station. The change consists of relabeling the curves from 6.68 effective full power years (EFPY) to 8.0 EFPY and from 8.0 EFPY to 10.0 EFPY.

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,

ORIGINAL SIGNED BY

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

Enclosures:
1. Amendment No. 94 to License No. DPR-35
2. Safety Evaluation

cc w/enclosures:
See next page

DISTRIBUTION

Docket File	CJamerson	BGrimes	OPA
NRC PDR	PLeech	TBarnhart (4)	RDiggs
Local PDR	OELD	WJones	HConrad
BWD#1 Reading	LJHarmon	DVassallo	EButcher
RBernero	ELJordan	ACRS (10)	JPartlow

DBL:PD#1	DBL:PD#1	OELD	DBL:PD#1
CJamerson	PLeech	E Chan	JZwolinski
5/12/86	5/13/86	5/19/86	5/20/86

cc:
Mr. Charles J. Mathis, Station Mgr.
Boston Edison Company
RFD #1, Rocky Hill Road
Plymouth, Massachusetts 02360

Resident Inspector's Office
U. S. Nuclear Regulatory Commission
Post Office Box 867
Plymouth, Massachusetts 02360

Chairman, Board of Selectmen
11 Lincoln Street
Plymouth, Massachusetts 02360

Office of the Commissioner
Massachusetts Department of
Environmental Quality Engineering
One Winter Street
Boston, Massachusetts 02108

Office of the Attorney General
1 Ashburton Place
19th Floor
Boston, Massachusetts 02108

Mr. Robert M. Hallisey, Director
Radiation Control Program
Massachusetts Department of
Public Health
150 Tremont Street
Boston, Massachusetts 02111

Regional Administrator, Region I
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Mr. James D. Keyes
Boston Edison Company
25 Braintree Hill Office Park
Braintree, Massachusetts 02184

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

BOSTON EDISON COMPANY

DOCKET NO. 50-293

PILGRIM NUCLEAR POWER STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 94
License No. DPR-35

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

   A. The application for amendment by Boston Edison Company (the licensee) dated February 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 3.B of Facility Operating License No. DPR-35 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 94 , 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: May 28, 1986.

ATTACHMENT TO LICENSE AMENDMENT NO. 94

FACILITY OPERATING LICENSE NO. DPR-35

DOCKET NO. 50-293

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
128	128
128A	128A
139	139

FIGURE 3.6.1

PILGRIM REACTOR VESSEL

PRESSURE - TEMPERATURE LIMITS

HYDROSTATIC AND LEAK TESTS

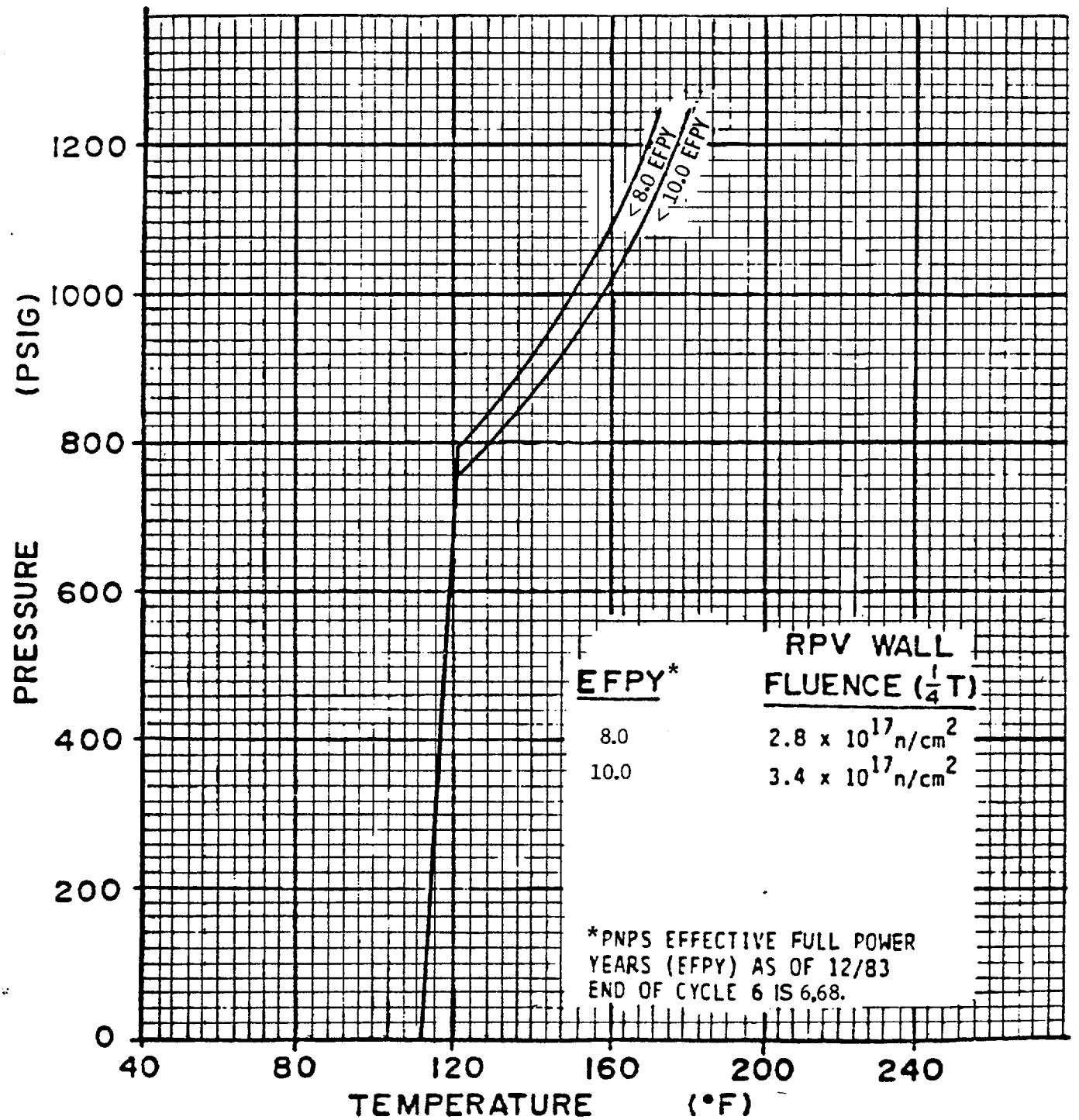
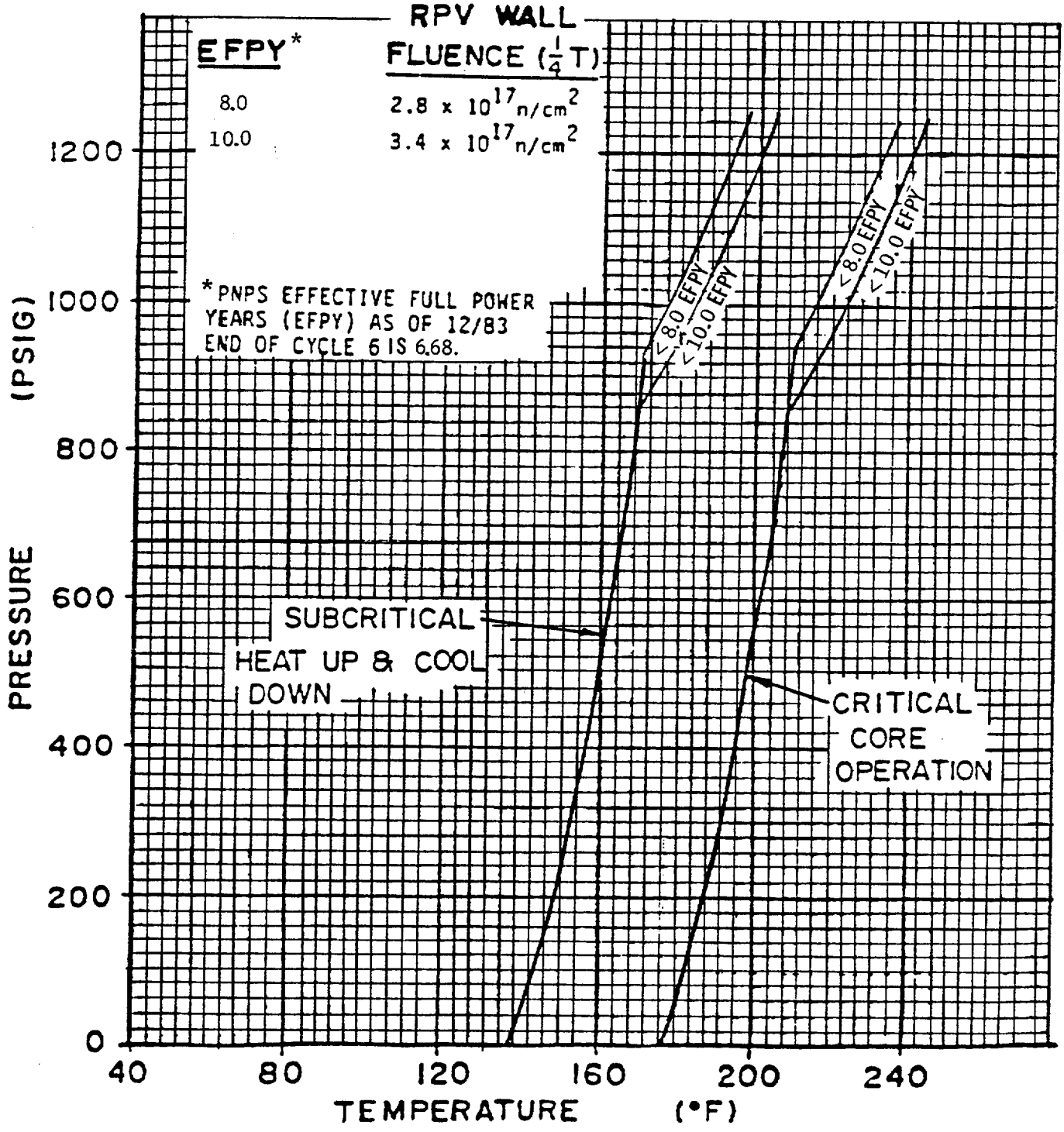


FIGURE 3.6.2

PILGRIM REACTOR VESSEL

PRESSURE - TEMPERATURE LIMITS

SUBCRITICAL / CRITICAL HEAT UP & COOL DOWN



Bases:

3.6.A and 4.6.A

Thermal and Pressurization Limitations (Cont'd)

The reactor coolant system 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.

Appendix G to 10CFR50 defines the temperature-pressurization restrictions for hydrostatic and leak tests, pressurization, and critical operation. These limits have been calculated for Pilgrim and are contained in Figures 3.6.1 and 3.6.2.

For Pilgrim pressure-temperature restrictions, two locations in the reactor vessel are limiting. The closure region controls at lower pressures and the beltline controls at higher pressures.

The nil-ductility transition (NDT) temperature is defined as the temperature below which ferritic steel breaks in a brittle rather than ductile manner. Radiation exposure from fast neutrons (>1 mev) above about 10^{17} nvt may shift the NDT temperature of the vessel metal above the initial value. Impact tests from the first material surveillance capsule removed from the reactor vessel have established the magnitude of the RT_{NDT} shift for the beltline. The shift, which is greatest for the weld metal, is tabulated below for various fluence levels:

RPV Wall Fluence (1/4T)	RT_{NDT}
2.8×10^{17} n/cm^2	61°F
3.4×10^{17} n/cm^2	68°F

Neutron flux wires and samples of vessel material are installed in the reactor vessel adjacent to the vessel wall at the core midplane level. The wires and samples will be periodically removed and tested to experimentally verify the values used for Figures 3.6.1 and 3.6.2. The withdrawal schedule of Table 4.6.3 has been established as required by 10CFR50, Appendix H.

The pressure-temperature limitations of Figures 3.6.1 and 3.6.2 applicable to the beltline reflect an initial RT_{NDT} of 0°F. This initial value is based

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 94 TO FACILITY OPERATING LICENSE NO. DPR-35

BOSTON EDISON COMPANY

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

1.0 INTRODUCTION

By letter dated February 28, 1986, the Boston Edison Company (licensee) proposed that the Pilgrim Nuclear Power Station (PNPS) Technical Specification pressure and temperature limit curves be changed. Specifically, it was proposed that the relationship between reactor pressure vessel (RPV) wall fluence and effective full power years (EFPY) be revised to more accurately reflect the neutron exposure that the Pilgrim RPV has received during its operation. This proposed change results in a relabeling of the EFPY for which each pressure and temperature limit curve is to be used.

In addition, it was proposed that the Technical Specification Bases be revised to remove the reference to the calculated relationship between EFPY and RPV wall neutron fluence, since this has been revised.

The purpose of the proposed change is to ensure that PNPS is not required to shut down prior to the planned end of the current operating cycle. This could occur if PNPS exceeds the EFPY specified in the Technical Specification which currently extends only to 8.0 EFPY. Assuming a continued 93% capacity factor is maintained at PNPS, 8.0 EFPY may be reached 1 to 2 months prior to the end of the current operating cycle.

The licensee has stated that the proposed change does not alter plans to submit new proposed thermal and pressurization limit curves for subsequent operating cycles, as described in the NRC letter from D.B. Vassallo to W.D. Harrington, dated February 13, 1985.

The staff has issued draft Regulatory Guide 1.99 Rev. 2 for public comment. Following the review and issuance of the Regulatory Guide additional changes to the Technical Specifications may be necessary.

2.0 EVALUATION

In accordance with 10 CFR Part 50, Appendix G, the PNPS Technical Specifications include pressure and temperature limits for the RPV to preclude non-ductile failure due to radiation-induced embrittlement. As PNPS is operated at power and the RPV receives more neutron radiation exposure, the pressure and temperature limits are periodically changed to reflect shifts in RPV material nil-ductility transition temperature induced by neutron exposure. An important part of this periodic adjustment is the

accurate determination of the relationship between plant operation time (EFPY) and neutron fluence to the RPV. This relationship is determined using both actual measurements from capsule test specimens and extrapolation to estimate the fluence for future operation.

The existing pressure and temperature limit curves were developed using neutron fluence measurements from a capsule test specimen pulled from the RPV at the end of Cycle 4 and extrapolated to project the neutron fluence for future cycles. This extrapolation technique overestimated the cumulative RPV neutron exposure for subsequent cycles. A recently completed rigorous radiation transport calculation has shown a significant reduction in neutron fluence over the period from the end of Cycle 4 to mid-Cycle 7. This newly calculated neutron fluence takes into acccount the reduced neutron fluence received by the RPV subsequent to Cycle 5 due to the change to a low-leakage core loading scheme.

With respect to the proposed pressure and temperature limit curves, the new calculation determined that a neutron fluence of 2.8×10^{17} n/cm^2 to the RPV wall (1/4 T) corresponds to 8.1 EFPY. Similarly, the neutron fluence 3.4×10^{17} n/cm^2 was found to correspond to 10.2 EFPY. However, for the purpose of the pressure and temperature limit curves, the neutron fluences are conservatively estimated to correspond to 8.0 and 10.0 EFPY, respectively.

We have reviewed the neutron fluence calculations which form the basis for the proposed change and find them to be acceptable. The proposed changes to the Technical Specifications relating to the pressure and temperature limits for reactor vessel hydrostatic and leak tests and subcritical/critical heat up and cool down and operation meet the requirements of 10 CFR Part 50, Appendices G&H, ASTM E-185, Regulatory Guide 1.99 Revision 1 and Appendix G, Section III of the ASME Code.

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: H. Conrad

Dated: May 28, 1986.