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DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Suppls 840813 ltr w/confirmatory calculations performed on internal rod pressures in fuel supplied by Exxon Nuclear Co, per 841031 telcon Tech Spec change request.

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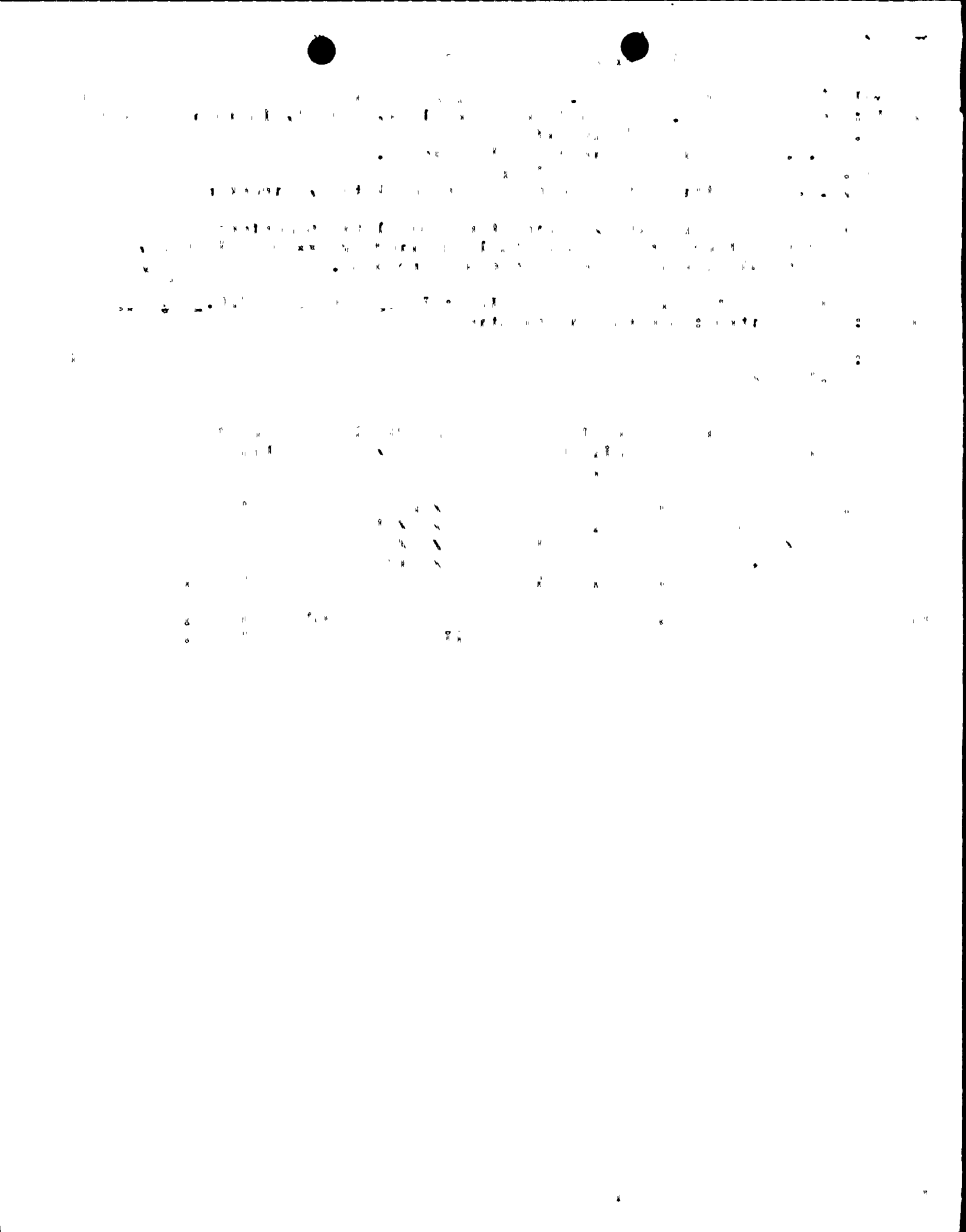

INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
COLUMBUS, OHIO 43216

November 20, 1984
AEP:NRC:0745P

Donald C. Cook Nuclear Plant Unit No. 1
Docket No. 50-315
License No. DPR-58
ADDITIONAL ANALYSIS SUPPORTING TECHNICAL SPECIFICATION CHANGE

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

This letter and its attachment supplement letter AEP:NRC:0745M, dated August 23, 1984. As requested during an October 31, 1984 telephone conference call with members of your staff, we have had confirmatory calculations performed on internal rod pressures in fuel supplied by Exxon Nuclear Company (ENC). These calculations were to be performed with power levels at the Technical Specification limit of $F_{\Delta H}$ up to a peak pellet burnup of 48,000 MWD/MTU, or if this resulted in the rod internal pressure exceeding the system pressure, to use power levels which bound the measured and predicted power levels.

The internal rod pressure calculated with the Technical Specification limit of $F_{\Delta H}$ throughout its entire burnup exceeded the system pressure. However, it is physically impossible for a single rod to run at the Technical Specification limit throughout its entire burnup. A power history which bounds the ENC fuel currently in the Donald C. Cook Unit 1 reactor produced a calculated rod internal pressure of 1903 psia at a rod burnup of 43,700 MWD/MTU. This result is less than the system pressure of 2250 psia and corresponds to a peak pellet burnup of 48,000 MWD/MTU, when calculated on a best estimate basis. The attached letter ENC-AEP/401, dated November 13, 1984, discusses these calculations in more detail.

The current burnup limit is expected to be reached on December 2, 1984 based on an updated calculation. Without the burnup extension requested in letter AEP:NRC:0745M, we would be unable to continue operation of Cycle 8 because of the current requirements of Technical Specification 3.2.2.

These analysis changes have been reviewed by the Plant Nuclear Safety Review Committee (PNSRC) and will be reviewed by the Nuclear Safety and Design Review Committee (NSDRC) at their next regularly scheduled meeting.

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In compliance with the requirements of 10 CFR 50.91(b)(1), a copy of this letter and its attachments have been transmitted to Mr. R.C. Callen of the Michigan Public Service Commission.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

M.P. Alexich 11/19/84
Vice President

JLB/bjs

Attachment
cc: John E. Dolan
W.G Smith, Jr. - Bridgman
R.C. Callen
G. Charnoff
NRC Resident Inspector - Bridgman
G. Bruchmann

ATTACHMENT TO:
AEP: NRC: 0745P.

EXXON NUCLEAR COMPANY, Inc.
600 - 108th Avenue N.E., C-00777, Bellevue, Washington 98009, Telephone (206) 453-4300

November 13, 1984
ENC-AEP/401

Mr. George John, Sr. Engineer
Nuclear Materials & Fuel Management
Indiana & Michigan Electric Company
c/o American Electric Power
One Riverside Plaza
Columbus, OH 43215

Subject: D.C. Cook Unit 1 Rod Internal Pressures

Dear Mr. John:

Attached is a description of the rod internal pressure analyses done in response to the NRC question on the Exxon Nuclear fuel in D.C. Cook Unit 1. In the analysis, the approved version of RODEX2 was used to calculate the internal fuel rod pressures for rods having the maximum burnup and bounding power histories supplied by AEPSC. In both cases, the internal pressure was less than the system pressure and therefore was acceptable.

If there are questions, or if I can be further help, please call me.

Sincerely,

for H. G. Shaw
Contract Administrator

HGS:RAC:naa

The end-of-life fuel rod internal pressures were calculated for two D.C. Cook Unit 1 cases provided by AEPSC with the approved RODEX2 code using the methodology described in Reference 1. The first case was for the Exxon Nuclear fuel which would see the maximum burnup and the second case was for a bounding, composite power history. For the bounding case, the peak LHGR for any of the Exxon Nuclear fuel currently in Cycle 8 was used, regardless of where the peak occurred. Both histories were developed from the in-core flux traces and the projected Cycle 8 history. Both histories also include a factor of 1.04 to account for measurement uncertainty. (A third case was calculated in which the actual power history of the peak power rod was uniformly increased such that the maximum power during its irradiation reached the Technical Specification limit. For this unrealistic case, in which the peak rod exposure of 43,700 MWD/MTU was reached about the middle of the third cycle, the internal rod pressure significantly exceeded the system pressure.)

The results of the analyses were that the maximum burnup rod had an internal pressure of 1453 and the bounding case rod had an internal pressure of 1903 psia. Both satisfy the design criterion of being less than system pressure. Therefore, the end-of-life rod internal pressure is satisfactory for peak rod exposures of up to 43,700 MWD/MTU (as described in Reference 2).

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1. XN-NF-81-58(P)(A), Revision 2, and Supplements 1 and 2, "RODEX2: Fuel Rod Thermal-Mechanical Response Evaluation Model," Exxon Nuclear Co., March 1984.

2. XN-NF-84-25(P), "Mechanical Design Report Supplement for D.C. Cook Unit 1 Extended Burnup Fuel Assemblies," Exxon Nuclear Co., August 1984.