NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

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FILE NUMBER

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TO: Mr. Edson G. Case

FROM: Indiana & Michigan Power Co.
New York, N.Y. 10004
Frank N. Brien

DATE OF DOCUMENT 03/22/78

DATE RECEIVED 05/03/78

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DESCRIPTION

Response to NRC request of 03/20/78 ...Furnishing info concerning environ qualification for equipment inside containment for a s steam line break and environ qualification tests on safety-related elect terminations inside containment, re final conditions required to be met prior to proceeding above 20% of rated pwr for Subject Facility...w/att supporting info... Notarized 03/22/78....

3p + 4p

PLANT NAME : DONALD C COOK UNIT 2
jcm 05/04/78

ENCLOSURE

1ENCL

FOR ACTION/INFORMATION

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BRANCH CHIEF:	KNIEL	BRANCH CHIEF:
PROJECT MANAGER:	MLYNCZAK	PROJECT MANAGER:
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NRC FORM 195 (2-76)

INDIANA & MICHIGAN POWER COMPANY
P. O. BOX 18
BOWLING GREEN STATION
NEW YORK, N. Y. 10004

March 22, 1978

Donald C. Cook Nuclear Plant Unit No. 2
Docket No. 50-316
DPR No. 74

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Case:

Our letter of March 17 was aimed at meeting the 2-week requirements in answer to your March 8 letter covering the four final conditions required to be met prior to proceeding above 20% of rated power. We provided information on each of these four conditions.

At a meeting on March 20, 1978 with your staff, in reviewing that response only two final items were left unresolved. This letter addresses and satisfactorily resolves these two remaining items.

The NRC Staff requested at the March 20, 1978 meeting in Bethesda, MD., additional information in two areas: (1) environmental qualification for equipment inside containment for a steam line break and (2) environmental qualification tests on safety-related electrical terminations inside containment.

The information requested in Item 1 is being sent by Westinghouse Electric Corporation in the form of 10 copies each of proprietary and non-proprietary versions of Additional Information on Environmental Qualifications of Safety-Related Instrumentation under cover of a letter dated March 22, 1978 from M. H. Judkis to Edson G. Case. Another 30 copies will be forwarded under separate cover. Indiana & Michigan Power Company has reviewed and concurs with the contents of the attachments to Mr. Judkis' letter which are revised pages to the report which was submitted by Westinghouse in their March 17, 1978 letter and placed on Docket 50-316 by John Tillinghast's March 17, 1978 letter.

The information requested in Item 2 is in the form of 10 copies of revised pages to the report titled "Steam Line Break Qualification Test Procedure and Results for Electrical Terminations" enclosed with John Tillinghast's letter of March 17. An additional

30 copies will be forwarded under separate cover. The revised pages present an update of the tests conducted on electric terminations at Westinghouse Electric Corporation--Canada, Hamilton, Ontario.

As of March 22, tests have been completed on 14 terminations as listed below:

No.	Quantity	Item
1.	2	3-phase sets of motor connections with Bishop tape termination
2.	2	3-phase sets of motor connections with Scotch tape termination
3.	4	3-phase sets of power cable splices
4.	2	Penn Union instrument terminal blocks
5.	4	3-phase, Cutler Hammer power terminal blocks

Items 1-4 above (10 of the 14 test terminations) passed the test. However, the tests on the four power blocks performed at Westinghouse-Canada are not conclusive. The test data and samples are currently being evaluated by our engineers and the experimenters, but based on the results to date it appears that additional testing will be necessary to provide a firm conclusion as to the adequacy of the power blocks. Under our current situation, operation of Unit 2 which began this morning is limited to 20% of rated power until the adequacy of these power blocks is demonstrated. Re-testing of these power blocks will take an appreciably longer time than replacing them with splices. We have therefore decided to replace the power block terminations with splices which have been qualified in the Westinghouse-Canada facility.

We plan to replace twelve power terminal blocks which are required to function following a loss-of-coolant accident or steam line break. Replacement will begin on March 23 under approved procedures and is expected to be completed on March 24, 1978.

At our March 20, 1978 meeting with the NRC staff you were able to determine that the documentation we provided in our March 17, 1978 letter on the electrical penetrations and Continental Wire Corporation instrument cable was sufficient to resolve the 2-week conditions of B3 and B4 in License Amendment No. 2. The

March 17, 1978 submission on transmitters and electrical terminations as supplemented by the enclosed information resolves the 2-week conditions of B-1 and B-2 in License Amendment No. 2.

Upon completion of the replacement of the power terminal blocks with splices all the requirements in License Amendment No. 2 will have been satisfied. We request your prompt written permission to permit operation beyond the 20% limit on rated power just as soon as the splice installation is complete.

Very truly yours,

INDIANA & MICHIGAN POWER COMPANY

Frank N. Bien

Frank N. Bien
Vice President

FNB:m
Enc.

Sworn and subscribed to before me
this 22nd day of March, 1978
in New York County, New York

Kathleen Barry
Notary Public

KATHLEEN BARRY
NOTARY PUBLIC, State of New York
No. 41-4606792
Qualified in Queens County
Certificate filed in New York County
Commission Expires March 30, 1979

cc: R. C. Callen
G. Charnoff
P. W. Steketee
R. J. Vollen
R. Walsh
D. V. Shaller - Bridgman
R. W. Jurgensen

Donald C. Cook Nuclear Plant Unit #2
Docket No. 50-316

From March 16-21, 1978 a test was conducted at the Westinghouse Electric Corporation - Canada in Hamilton, Ontario to demonstrate the ability of safety related terminations used inside the containment of Unit 2 at the Donald C. Cook Nuclear Plant to maintain electrical integrity and operability during and after a postulated steam line break incident. The tested terminations are identical in design, fabrication and installation to those in Unit 2 of the Donald C. Cook Nuclear Plant. The purpose of this discussion is to describe the test conducted and to present the overall test results. A formal test report is under preparation.

The termination configurations tested consisted of four three phase sets of motor connections (2 consisting of #10 cable with Scotch 23 tape plus neoprene in an enclosure, and 2 consisting of #10 cable with Bishop 962 tape in an enclosure) and 4 three phase sets of power cable splices (2 consisting of #10 solid Kapton wire to #10 Hypalon cable butt spliced with Raychem Class N material and 2 consisting of #10 solid Kapton to #10 stranded Kapton butt spliced with RT876 heat shrink tubing) and four three phase sets of Cutler-Hammer Power Terminal Blocks (2 - 70 ampere blocks and 2 - 125 ampere blocks). All test specimens were connected with #10 or #2 AWG conductors and electrical test connections are made to each point.

[illegible]
[illegible]

[illegible]

The test terminations were subjected to the following environmental profile:

1. 340° (min.) for 1 hour at 12 psig (min.).
2. Reduced temperature over approximately 30 minutes to 250° F at 12 psig (min.) and then held at a minimum of 250° for 117 hours, 12 minutes.
3. Five minutes after the 340°F temperature was reached, a chemical environment was created in the test autoclave. This environment was created by spraying a 2500 ppm boric acid solution, buffered by NaOH to a pH of 9 to 10, into the autoclave. This environment was maintained for the duration of the test.

Prior to the start of the test, with the test terminations in the autoclave and under room ambient conditions, the insulation resistance of all test items were measured individually and in series using a 500 V DC insulation tester.

During the test, the terminations were continuously energized at 600 volts AC, 5 amps. The autoclave temperature, pressure, test circuit currents and voltages were measured and recorded hourly. Insulation resistance was measured at intervals during the course of the test. A test specimen is considered to pass the tests if, with all three phases energized, leakage current in any one phase does not exceed one ampere.

Upon termination of the test, a final set of test parameter values were recorded, including insulation resistance. There was no significant electrical degradation of any of the splices and motor connections during this test. The autoclave was depressurized and cooled down to approximately room ambient conditions. Data was recorded to indicate the approximate cooldown rate. After the terminations had cooled sufficiently, they were removed from the autoclave and visually inspected for damage and degradation. None was found.

A deviation in leakage readings on one of the two #10 Solid Kapton wire to #10 stranded Kapton wire splices during the test was proven by post test evaluations to be a problem in the lead in wires to the test specimen external to the specimen and not in the test specimen (i.e. splice) itself.

Samples of both the 125 ampere and 70 ampere Cutler-Hammer terminal blocks exhibited leakage current behaviors above those acceptable under the test criteria. The results of the tests on these blocks are still being evaluated but preliminary evidence indicates that marker strips on the terminal blocks melted and water collected in the bottom of the boxes. These two items in all probability contributed to the high leakage current problem and can be corrected.

The Westinghouse Corporation's Quality Assurance Department and American Electric Power Service Corporation personnel maintained surveillance over the conduct of the test to assure compliance with test procedures. Third party verification of adherence to test procedure and instrument calibration requirements was provided by Mr. Warren Dunning of the Franklin Institute.

In summary, the successful completion of the test described demonstrates that these safety related splices and motor connections used inside the containment of Unit 2 at the Donald C. Cook Nuclear Plant are fully capable of maintaining electrical integrity and operability during and after a postulated steam line break incident. Additional testing will be necessary to prove the electrical integrity and operability of the power terminal blocks.