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AUTH.NAME AUTHOR AFFILIATION
ALEXICH,P. Indiana & Michigan Electric Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Responds to Generic Ltr 83-41, "Fast Cold Starts of Diesel Generators." Maint of preheat & prelubrication eliminates engine stresses caused by cold starts. Fast start engine stress mitigated only by reducing frequency of starts.

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AUTH.NAME AUTHOR AFFILIATION
ALEXICH,M.P. Indiana & Michigan Electric Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Responds to Generic Ltr 83-01, "Fast Cold Starts of Diesel Generators." Intent of proposed tech spec eliminates engine stresses caused by cold starts. Fast start engine stress eliminated only by reducing frequency of starts.

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INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
COLUMBUS, OHIO 43216

January 6, 1984

AEP:NRC:0862

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
FAST COLD STARTS OF DIESEL GENERATORS
(Generic Letter 83-41)

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

Dear Mr. Denton:

This letter is in response to your request for information in Generic Letter 83-41, "Fast Cold Starts of Diesel Generators". In response to item (1) of that letter please note that we do not start our diesels in the "cold" condition. Nevertheless, we have had several fast starts over the specified period, principally due to surveillance/technical requirements. These starts are listed on Table 1, by category as you requested.

In response to Item (2), our assessment of fast and cold starts is presented below.

The diesel engines at D. C. Cook Plant are always started fast from the Control Room, except for maintenance operations following certain inspections or overhaul. (These "slow" starts are not included in Table 1.) However, the diesel engines are never started entirely cold or unlubricated because of the following preventive maintenance policies. 1) The cooling jacket water is heated to about 160F and circulated through the engine to maintain the engine at its approximate operating temperature. 2) The crankshaft and lower engine is continuously pressure lubricated by oil maintained at about 140F. and 3) The upper valve gear assembly is intermittently lubricated to assure an ample supply of lube oil for fast starting of the engine.

The diesel engine manufacturer recommends operation of the auxiliary lube oil pump for several minutes before starting the diesel engine and a slow and controlled acceleration with limited fuel injection to rated speed if maximum service life is to be expected from the engine. Operation of unloaded diesel engines for extended periods of time is not recommended by the manufacturers. This is an additional reason for not starting the engines unless necessary.

A056
1/1

The diesel fuel injector is timed to inject before top dead center to allow time for ignition to occur when the piston is at top dead center while operating at rated speed. The expanding products of combustion force the piston down at a time when the crankshaft has turned far enough to be rotated by the downward force. During starting, the crankshaft rotation is much slower than rated and the fuel injection timing is early enough to permit combustion to occur while the piston is still approaching top dead center (up stroke). This, coupled with the injection of a full fuel charge to achieve maximum acceleration for fast starting, results in the piston being forced down by the combustion of the full fuel charge at the same time the piston is being forced up by the engine cranking power. This produces more stress on the connecting rod bearing and main bearing at the crankshaft than any other operating condition. Therefore, even though we run the auxiliary lube oil pump continuously, numerous fast starts will result in less service life than can be achieved in following the manufacturers slow and controlled acceleration recommendations.

During the initial reliability tests of the Unit 1 diesel generators we found that intermittent lubrication was inadequate to prevent engine crankshaft, bedplate and connecting rod bearing damage. One engine was badly damaged. The engine was rebuilt and the lubrication system revised to provide continuous lubrication for the crankshaft and connecting rod bearings.

We believe that by maintaining pre-heat and pre-lubrication we have eliminated the engine stresses caused by cold starts as much as possible. The stresses caused by "fast starts" can only be mitigated by reducing the frequency of starts.

The monthly surveillance tests provide the necessary exercise to assure operability. In addition, the refueling surveillance tests demonstrate the ability of the engines to perform their intended function. The remaining surveillance tests such as those required to demonstrate operability of the redundant engine when one engine is removed from service or one offsite power source is de-energized are examples of requirements that could be deleted without deliteriously affecting the Diesel Generator Safety function.

This letter 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
Vice President

MPA/cam

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

TABLE 1

NUMBER OF FAST DIESEL ENGINE STARTS

December 1, 1982 thru December 1, 1983

Number of Fast Starts[1]

REASON FOR START/TEST	UNIT 1 Generators		UNIT 2 Generators		TOTAL
	AB	CD	AB	CD	
SURVEILLANCE					
Monthly Surveillance	11	12	12	12	47
18 Month Surveillance	4	4	7	7	22
Other Tech Spec Requirements	11	8	19	21	59
MAINTENANCE					
Maintenance Runs	10	3	5	7	25
Post Maint. Runs To Prove Operability	5	4	1	2	12
ACTUAL DEMAND[2]	0	3	2	4	9
TOTAL STARTS	41	34	46	53	174

(1) The diesel engines at D. C. Cook Plant are never started cold.

(2) The D. C. Cook Plant did not experience Offsite Power Loss. Actual Demand was caused by Safety Injection Initiation or bus switching.

January 5, 1984

DISTRIBUTION
Docket File
ORB#1Rdg
CParrish

DOCKET NO(S). 50-315/316

Mr. John Dolan, Vice President
Indiana and Michigan Electric Company
c/o American Electric Power Service Corporation
1 Riverside Plaza
Columbus, Ohio 43215

SUBJECT:

DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2

The following documents concerning our review of the subject facility are transmitted for your information.

- ☐ Notice of Receipt of Application.
- ☐ Draft/Final Environmental Statement, dated _____.
- ☐ Notice of Availability of Draft/Final Environmental Statement, dated _____.
- ☐ Safety Evaluation Report, or Supplement No. _____, dated _____.
- ☐ Notice of Hearing on Application for Construction Permit.
- ☐ Notice of Consideration of Issuance of Facility Operating License.
- ☐ Application and Safety Analysis Report, Volume _____.
- ☐ Amendment No. _____ to Application/SAR dated _____.
- ☐ Construction Permit No. CPPR- _____, Amendment No. _____, dated _____.
- ☐ Facility Operating License No. _____, Amendment No. _____, dated _____.
- ☐ Order Extending Construction Completion Date, dated _____.
- ☒ Other *(Specify)* Monthly Notice covering period through December 21, 1983.

Expiration date for hearing requests and comments January 20, 1984.

Division of Licensing
Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: w/enclosure

OFFICE	ORB#1:DL						
SURNAME	CParrish:ps						
DATE	1/5/84						

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

January 5, 1984

DOCKET NO(S). 50-315/316

Mr. John Dolan, Vice President
Indiana and Michigan Electric Company
c/o American Electric Power Service Corporation
1 Riverside Plaza
Columbus, Ohio 43215

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☒ Other *(Specify)* Monthly Notice covering period through December 21, 1983.
Expiration date for hearing requests and comments January 20, 1984.

C. Berlinger
Division of Licensing
Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: w/enclosure

cc: Mr. M. P. Alexich
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American Electric Power Service
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Columbus, Ohio 43215

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Shaw, Pittman, Potts and Trowbridge
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Honorable Jim Catania, Mayor
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United States House of Representatives
Washington, DC 20515

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