NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

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TO:
Mr. Benard C. Rusche

FROM:
Indiana & Michigan Power Company
New York, New York
Mr. John Tillinghast

DATE OF DOCUMENT: 10/19/76

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DESCRIPTION

Ltr. w/attached...notorized 10/20/76.... re our 8/13/76 ltr. and their 9/9/76 ltr. ....concerning evaluation of their system design to determine susceptibility to overpressurization events.

REACTOR VESSEL OVERPRESSURIZATION DISTRIBUTION PER G. ZECH 10-21-76

(6-P)

PLANT NAME:
Cook Unit #1

ENCLOSURE

DO NOT REMOVE

ACKNOWLEDGED

FOR ACTION/INFORMATION 10/28/76 RJL

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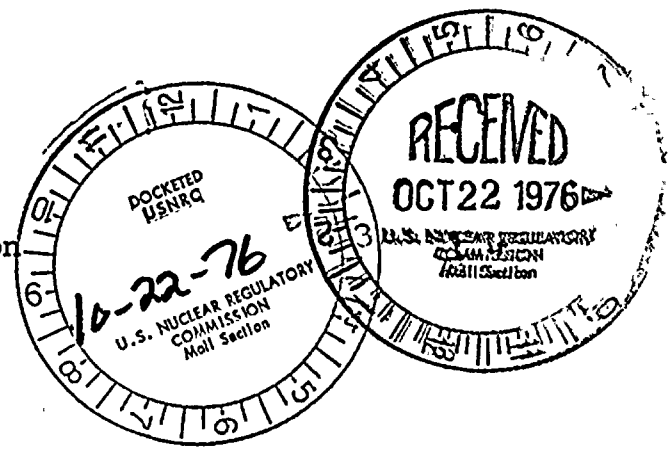
NRC FORM 195 (2-76)

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

October 19, 1976

Donald C. Cook Nuclear Plant Unit No. 1
Docket No. 50-315
DPR No. 58



Mr. Benard C. Rusche, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Rusche:

Indiana & Michigan Power Company was requested by Mr. Dennis L. Ziemann's letter of August 13, 1976 to evaluate our system design to determine susceptibility to overpressurization events, analyze the possible events and propose interim plus permanent modifications to systems and procedures to reduce the likelihood and consequences of such events. On September 9, 1976, we transmitted a letter stating that a task group of utilities with Westinghouse plants had been formed to evaluate this problem and that we would review our operating procedures to minimize the likelihood of overpressurization events. We also stated that at the end of the 60-day period, addressed in the August 13 letter, a report of progress in this evaluation and review would be provided. This letter provides that report.

A meeting was held by the utility group on September 23, 1976, to review and discuss actions performed by the utilities and Westinghouse. The following presents major items and conclusions of that meeting:

A. The overpressurization events which have occurred

on Westinghouse designed plants were discussed and the cause of each of the events was noted. In addition, effectiveness of assumed mitigating systems, such as a relief valve, was considered. The review of these occurrences indicated that single equipment failure or operator error initiated the event and some form of pressure relief would reduce the consequences of such events.

B. The grouping of various plants was considered as a means to reduce the amount of analysis necessary to evaluate the effectiveness of using the pressurizer power operated relief valves. The review of parameters which would affect analysis results indicated that plant grouping was not necessary because Westinghouse plants are sufficiently similar to envelope the plants by use of a bounding analysis.

C. The pressurizer power operated relief valves were found to have significant water relief capability and are relatively quick opening valves, i.e., approximately 3-second opening time.

D. The preliminary evaluation of mass injection induced transients from all possible dynamic sources indicates that the pressurizer power operated relief valves are of the proper mass/flow characteristics to limit the pressure surges of such events.

E. The preliminary evaluation of component temperature difference induced transients following a reactor coolant pump start indicates that the pressurizer power operated relief valve may be capable of mitigating the pressure surge of such an event. The equipment temperature difference in conjunction with a pump start induced pressure transient will require a detailed transient analysis to assure acceptability of the system modification selected.

F. Due to the preliminary indications that the pressurizer power operated relief valves may be capable of providing overpressure protection during solid system operation, the overpressurization transients will be analyzed assuming a mitigating system employing the pressurizer power operated relief valves.

G. A subcommittee was formed to evaluate the possible overpressurization events for the purpose of defining the conditions and parameters to be included in the transient analysis. This

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subcommittee was directed to meet with Westinghouse and reach concurrence as to the number of events and conditions for each event to be analyzed. This meeting was held on September 28, 1976.

H. A second subcommittee was also formed to review operating characteristics such as chemistry requirements and temperature difference limits which affect implementing procedures to minimize solid system operation by use of a steam bubble at low reactor system average temperatures. This second subcommittee also was directed to consider an action plan should Appendix G limits be exceeded. This committee met on September 29, 1976.

The meetings which have been held by the task group and the subcommittees have resulted in agreement as to a course of action to resolve this overpressurization problem. This course of action includes transient analysis. The transient analysis will include consideration of mass input induced overpressurization and heat input induced overpressurization. The range of system and component physical parameters, performance characteristics and operating limits applicable to Westinghouse designed plants will be used to bound the analysis. Conservative assumptions will be employed to characterize the relief valve performance.

The single failure criteria presented in your letter of August 13, 1976, will be applied. That is, no single event, whether equipment failure or operator error, will result in Appendix G limitations being exceeded. If the overpressurization transient is caused by an equipment failure or operator error, that failure or error will be considered the single failure event and all subsequent actions resulting from the failure or error which could reduce the effectiveness of the mitigating system will be considered and included in the analysis.

The preliminary evaluations performed indicate that protection of a solid reactor coolant system by use of a relief system, from an inadvertently opened safety injection accumulator which is charged to its operating pressure, is not practical. At the Cook Nuclear Plant an administrative control which closes and locks out power to the accumulator injection valves during cooldown, at Reactor Coolant System Pressure of 1000 psig is in force, and has been written into our Operating Procedures.

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At the bottom of page 2 of your August 13, 1976 letter, you state that the evaluation of the overpressurization incident should be made using "the most limiting initial conditions" and "with the worst single failure or operator error as the initiating event." Even with administrative controls, if these assumptions are used, 100% assurance of remaining within Appendix G limits cannot be provided. However, with whatever modifications are installed as a result of the analysis addressed above, the consequences of an overpressurization transient will be significantly less severe. Since the remote possibility of exceeding Appendix G limits by a small amount will still exist following installation of any mitigating system, it will be required that following an overpressurization transient, an analysis of the event will be made to determine the long term consequences of the event and the impact upon plant safety. Such an analysis would include reasonably sized flaw assumptions and the detailed information applicable to the specific reactor vessel for the NEUTRON fluence accumulated at the time of the event. The analysis would be similar to the analysis presented by Virginia Electric Power Company in Abnormal Occurrence Report AO-S1-73-01-10 dated February 13, 1973, following the overpressurization due to opening an accumulator isolation valve with a solid reactor coolant system. Following completion of such analysis and assurance that continued operation would not adversely affect the health and safety of the public, we would proceed with normal operations and provide a detailed report of the incident and analysis to the Commission.

In response to the August 13, 1976 letter to provide all information requested within 60 days or explain why this schedule cannot be met, it should be pointed out that the analysis of the overpressurization transients will be a major activity with an estimated duration of six months. Following completion of this analysis, modification to the Donald C. Cook Nuclear Plant will be initiated consistent with analysis results. The schedule for the modification activity will be provided following completion of the analysis and detailed identification of the modification performance requirements.

We have reviewed our operating procedures to determine if changes to the procedures are necessary to conform to the objective of limiting solid system operation to the minimum time

[illegible]

practical and to increase the awareness of the operators to plant conditions that have the potential of initiating overpressurization transients. The procedure review led to the revision of three operating procedures. A review of the instrumentation available for monitoring an overpressurization incident indicated that sufficient instrumentation is available to assure that a record of any incident is obtained. Attachment 1 includes a description of the review performed and the instrumentation installed at the Donald C. Cook Nuclear Plant to provide a record of both pressure and temperature in the event of an overpressurization transient.

Very truly yours,

John Tillinghast
Vice President

JT:mam
Attachment

Sworn and subscribed to before me
this 20 th day of October 1976 in
New York County, New York

Notary Public STUART KAUFMAN
Notary Public, State of New York
No. 41-4609585
Qualified in Queens County
Certificate filed in New York County
Commission Expires March 30, 1977

cc: G. Charnoff
R. J. Vollen
R. C. Callen
P. W. Steketee
R. Walsh
R. S. Hunter
R. W. Jurgensen - Bridgman

Attachment 1

The following procedures have been revised to include non-solid system (Steam Bubble) operation whenever possible thus minimizing the time at which we are in solid water operation:

a) OHP 4021.001.001 entitled, "Plant Heatup from Cold Shutdown to Hot Standby"

b) OHP 4021.001.004 entitled, "Plant Cooldown from Hot Standby to Cold Shutdown"

c) OHP 4021.002.001 entitled, "Filling and Venting Reactor Coolant System"

Instrumentation installed at the Donald C. Cook Nuclear Plant to record pressure and temperature in the event of an overpressurization transient consists of the following:

A) Pressure:

1) Wide range pressure recorder on loops 1&2 with a pressure range from 0 - 3000 psig

2) Narrow range pressure indicator on loop 2, which monitors pressure in the range from 0 - 600 psig

3) Pressurizer pressure is monitored by 4 pressure indicators and 1 pressure recorder, in the pressure range from 1700 - 2500 psig

B) Temperature:

1) Cold and Hot leg temperature recorders on each of the 4 loops with a temperature range from 0 - 700°F

2) RHR temperature recorder "E" and "W" with a range from 50 - 400°F.