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DENTON,H.R. OFFICE OF NUCLEAR REACTOR REGULATION

SUBJECT: Responds to A Schwencer ltr of 781228 re containment purging during normal plant operation.Provides justification for unrestricted purging.Requests NRC review Tech Spec change request rapidly.

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INDIANA & MICHIGAN POWER COMPANY
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NEW YORK, N. Y. 10004

January 4, 1979
AEP:NRC:00114

Donald C. Cook Nuclear Plant Units 1 & 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
RE: CONTAINMENT PURGING DURING NORMAL PLANT OPERATION

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 Mr. A. Schwencer's letter dated November 28, 1978 concerning containment purging during normal plant operation. In that letter, recent events at other nuclear units and licensing concerns relative to potential failures affecting the purge penetration valves, were brought to our attention. I would like to point out that the issue of containment purging during normal plant operations was included in the operating license review for D. C. Cook Unit 2 as part of Containment Systems Branch question 022.4.

Mr. Schwencer's letter requests that we provide a commitment to cease all containment purging during plant operation or a justification to continue purging the containment. We have elected to provide justification for unrestricted purging in accordance with Item (3) on page 3 of Mr. Schwencer's letter.

Since initial fuel loading, purging in Unit 2 has been restricted by the NRC to the Cold Shutdown Condition (Mode 5). This Unit 2 restriction, in conjunction with Mr. Schwencer's letter which applies to both Units 1 & 2, represents a serious operating penalty for the Donald C. Cook Nuclear Plant. Furthermore, our past experience shows that purging 90 hours per year will be insufficient to perform surveillance or maintenance work in the containment above Mode 5. We need to be allowed the use of the containment

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ventilation system as frequently as required in both Units 1 and 2 of the Cook Nuclear Plant. Please note that our request for a Technical Specification change on Unit 2 to delete the restriction on purging has been under review by your staff since our submittal dated January 13, 1978, as supplemented. The information provided in those submittals also applies directly to Unit 1 and therefore we do not feel it necessary to make any further commitments which would restrict purging Unit 1.

More specifically, Item (3) of Mr. Schwencer's letter requested the following:

"If you plan to justify unlimited purging you need not propose a Technical Specification change at this time. You must, however, provide the basis for purging and a schedule for responding to the issues relating to purging during normal operation as described in the enclosed Standard Review Plan Section 6.2.4, Revision 1, and the associated Branch Technical Position CSB 6-4. As discussed in these documents, purging during normal operation may be permitted if the purge isolation valves are capable of closing against the dynamic forces of a design basis loss-of-coolant accident. Also, basis for unlimited purging must include an evaluation of the impact of purging during operation on ECCS performance, an evaluation of the radiological consequences of any design basis accident requiring containment isolation occurring during purge operations, and an evaluation of containment purge and isolation instrumentation and control circuit designs. Within thirty days of receipt of this letter, you are requested to provide a schedule for completion of your evaluation justifying continuation of unlimited purging during power operation."

All of the above requests for additional information and justification of unlimited purging, have already been provided for Unit 2 of the Cook Nuclear Plant. This letter references them for use on Unit 1 as well. The relevant information is contained in the following documents:

(1) Response to Questions 022.4 and 022.13 contained in Appendix Q, Amendment 78 to the FSAR. This provided our response to Branch Technical Position CSB 6-4 including the impact on ECCS performance and an evaluation of the radiological consequences of a design basis accident during purge operation. The responses to Questions 022.4 and 022.13 apply both to Unit 1 and Unit 2 of the Cook Nuclear Plant.

(2) Our submittal of January 13, 1978 on Unit 2 provided the results of the purge valve operability test. The containment purge valves, as the test results show, are capable of closing against the dynamic forces of a design basis loss-of-coolant accident. This applies to both Units 1 and 2 of the Cook Nuclear Plant.

(3) Our submittal of February 3, 1978 on Unit 2, which provided supplemental information requested by the NRC staff. Please note that our re-review of this submittal subsequent to the receipt of Mr. Schwencer's letter, has uncovered a typographical error which we are now correcting. The valve location given for the Lower Containment Purge Exhaust was incorrectly stated in Appendix A of our submittal as 135°-26'-33", it should have been stated as 155°-26'-33". This change has no effect on any of the conclusions reached with regard to the valve operability test and the containment purging issue. The contents of the February 3, 1978 submittal also apply to Unit 1.

(4) Our submittal of April 27, 1978 on Unit 2 supplied analyses that demonstrate the operability of the lower compartment purge system based on the test already performed. The submittal applies equally to Unit 1. The analysis provided shows that although lower compartment pressures might be higher than the test pressure, the pressures expected at the inboard containment isolation valves in the lower compartment purge and vent lines would be less than the pressure which existed during the valve operability test. This is achieved by installing debris screens in the lower compartment purge systems which provide a high flow resistance.

However, a review of this submittal performed subsequent to the receipt of Mr. Schwencer' s letter,has uncovered that the 30" lower containment purge exhaust and the 24" lower containment purge supply were incorrectly identified as penetrating the containment into elements 6 and 31 respectively. The actual location for the 30" containment exhaust and the 24" containment supply are elements 1 and 27 respectively. The peak pressures in elements 1 and 27 are slightly higher than those from elements 6 and 31, used in the design of new debris screens for these penetrations.

We have reanalyzed our previous calculations to account for this pressure increase and found the following.

Using the element 1 peak pressure of 15.2 psig(1) instead of the 15.0 psig for element 6, analysis shows pressures upstream of the two 30" lower containment exhaust valves of 19.55 psia and 18.98 psia, only six-tenths of one percent higher at the inlet to the valves. The maximum closing torque on the valves based on element 1 pressures increases by 3.5%, which is below the maximum torque experienced during the 30" upper containment purge exhaust valve test and approximately half of the manufacturer's allowable value.

In addition, the pressures at the valve inlets are based on calculations using a conservative resistance coefficient of 0.6 for the elbows in the containment purge lines. A resistance coefficient of 0.2 would be closer to the real value. If this more realistic value of the resistance coefficient for the elbows were used,the pressure at the inlet to the 30" lower containment purge exhaust would be lower than during the valve test, even at the peak containment pressure of 15.2 psig in element 1.

(1) FSAR Appendix Q Figure 22.5-52

(4) Continued

The adequacy of design of the 24" lower containment purge supply line was also examined using the higher peak pressure of 11.4 psig (2) from element 27, instead of the value obtained from element 31 of 11.0 psig. The actual void ratio of the new installed debris screen is 52.7% rather than the 55% used in the original analysis. With this void ratio and a peak containment pressure of 11.4 psig, the analysis produces pressures at the inlet of the valves well below the pressures experienced during the test of the 30" upper containment purge valves.

Therefore, the debris screens installed in Unit 2 for both the 30" lower containment purge exhaust and the 24" lower containment purge supply are adequately designed and this design will now be applied directly to the corresponding valves in Unit 1.

(5) Our submittal of August 11, 1978 (AEP:NRC:00069) on Unit 2 provided additional information requested by your staff and applies equally to Unit 1.

(6) Our submittal of September 11, 1978 (AEP:NRC:00082) on Unit 2 provided sensitivity analyses of the resistance coefficients for the elbows and debris screens and the dependence on those coefficients of the resulting torque and applies equally to Unit 1.

No new analyses or additional information need be provided for Unit 1. We will be proceeding with the installation of the debris screens on Unit 1 during the 1979 refueling outage (scheduled for April-May). These debris screens have previously been installed on Unit 2.

Additionally, Item (3) of Mr. Schwencer's letter requested an evaluation of containment purge and isolation instrumentation and control circuit designs. Because of the Millstone and Salem events we were requested to "review the design of all safety actuation signal circuits which incorporate a manual override feature to ensure that overriding of one safety actuation signal does not also cause bypass of any other safety actuation signal, that sufficient physical features are provided to facilitate adequate administrative controls, and that the use of each such manual override is annunciated at the system level for every system impacted."

At the Cook Plant, Containment Ventilation Isolation at the system level is initiated automatically by containment environment monitors and by safety injection. Manual initiation is by operation of a control switch mounted on a panel in the control room. Once initiated, either automatically by monitoring devices or manually by operator action, the circuit remains in the actuated

(2) FSAR Appendix Q Figure 22.5-33

condition whether the initiating signal is present or not. The actual isolation is accomplished by closing the containment purge valves.

To restore the circuit to the non-trip condition, the operator must manually reset the Containment Ventilation Isolation by operating momentary contact switches (push button) on the control panel. The circuit will restore to the non-trip condition whether the trip initiating signal is present or not. If the trip initiating signal is present when the reset is performed, then all other automatic initiating signals are blocked. The circuit will remain blocked until the initiating signals have been restored to the non-trip condition. A trip initiating signal received after the block had been removed, would again initiate containment ventilation isolation. Control room annunciation is provided by the trip initiating signals and separate annunication is provided when the purge isolation circuit is in the tripped condition.

The operator may reinitiate containment ventilation isolation at any time whether the automatic initiation has been blocked or not.

Operation of the containment ventilation isolation trip opens normally closed contacts in the solenoid circuit of each of the containment purge valves. Since the purge valves are air-to-open with energize-to-open solenoid valves, de-energizing the solenoid valves will cause the purge valves to close. Once the solenoid valve has been de-energized by opening the contacts of isolation circuit, the purge valve will remain closed and cannot be reopened by manipulation of the valve control switch. In addition, once the valve has been closed by action of the containment ventilation isolation, it will not automatically reopen after the isolation trip has been reset. The operator must reopen each valve by operation of its control switch after the trip has been reset.

In order for the purge valves to be reopened the operator would have to:

a) Ignore the control room annunciation mentioned above,

b) Ignore the applicable operating procedures which,in the case of automatic initiation by containment environment monitors, would tell him to turn on the containment auxiliary cleanup system to reduce radiation levels below the trip setpoint.

c) Reset the trip circuit.

d) Operate the purge valve control switches to reopen the valves.

Also subsequent safety actuation signals calling for containment ventilation isolation, received after the trip, would themselves be annunciated.

Our existing procedures provide the operator with a sufficient level of awareness to preclude the above sequence of events.

The following additional system actuation circuits were also reviewed:

a) Spray Actuation

b) Containment Isolation Phase A

c) Containment Isolation Phase B

d) Safety Injection

Each of the above system actuation circuits employs the same characteristics as the Containment Ventilation Isolation in that the RPS signals which initiate its action can be blocked by operation of its respective reset switch and, if the trip initiating signal remains, the resetting action will block all further automatic trips. The exception to the above is Safety Injection which cannot be reset until a fixed time delay has elapsed.

There may be times when it is necessary and desirable to operate the containment pressure relief system even if its operation is being prevented by an automatic Containment Ventilation Isolation signal from one of the containment environment monitors.

The procedure to remove the initiating signal and permit resetting of Containment Ventilation Isolation without blocking other automatic trips will be, after a proper evaluation has been carried through, to place the tripped channel in its "reset" position. This action will remove the initiating signal from the Containment Ventilation Isolation circuit and will alert the operator via an annunciator that this channel is in the reset mode. Containment Ventilation Isolation may then be reset and the containment pressure relief system operated; all remaining automatic trip signals will still initiate Containment Ventilation Isolation and trip the pressure relief system automatically.

In order to increase the already high level of operator awareness of the previously mentioned conditions, the following additional steps have been taken to prevent resetting safety actuation circuits with an initiating signal input present.

(1) A warning notice has been posted on the control panels of both units directly beneath the reset pushbuttons which reads, "Do Not Reset Until The Cause For The Initiating Signal Has Been Evaluated".

(2) The following operating procedures for both units have been revised to include precautionary statements and instructions about resetting the system:

(a) Safety Injection Actuation

(b) Termination of Safety Injection

(c) Operation of Containment Pressure Relief System

(d) Operation of Containment Purge System

(e) Instrument Room Purge

(3) The Plant Training Section will include instruction about this condition in the next operator requalification series which will start January 4, 1979.

This completes our review of the "bypass circuitry." Aside from the additional procedural steps taken above, no changes are required or planned. We feel that appropriate management control and adequate procedural steps have been taken so as not to require design changes. The procedural steps described above make use of existing plant equipment in a manner that meets the intent of the NRC to assure that operation of a bypass will not affect safety functions.

In summary, we firmly believe that we have taken adequate steps to allow unrestricted purge operation on the Cook Nuclear Plant. We would like to request that the NRC staff's review of our request for a Technical Specification change on Unit 2, concerning this matter, be expedited, so that resolution of this issue can be accomplished without unnecessary delay and operational hardships for the Cook Plant.

Very truly yours,

John Tillinghast
Vice President

Sworn and subscribed to before me
this 4th day of January, 1979 in
New York County, New York

Notary Public

NOTARY PUBLIC, State of New York
No. [illegible]
Qualified in Queens County
Certificate filed in New York County
Commission expires March 30, 1979

cc: (Attached)

cc: R. C. Callen
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