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SUBJECT: Forwards addl info requested during 790531 meeting w/NRC re unrestricted containment purging.

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AMERICAN ELECTRIC POWER *Service Corporation*

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June 29, 1979
AEP:NRC:00714B

Donald C. Cook Nuclear Plant Units 1 & 2
Docket Nos. 50-315 & 50-316
License Nos. DPR-58 & DPR-74

Mr. A. Schwencer, Chief
Division of Operating Reactors -Branch No. 1
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

REGULATORY DOCKET FILE COPY

Dear Mr. Schwencer:

On May 31, 1979 we met with members of your staff to discuss the matter of containment purging during normal operation. The attachment to this letter provides the additional information on the subject of unrestricted purging that was requested at the May 31, 1979 meeting. This information is being transmitted to you informally, not for docketing, and is provided for your information only.

Very truly yours,

R. W. Jurgensen
Chief Nuclear Engineer

RWJ:em

cc: R. C. Callen
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Donald C. Cook Nuclear Plant Units 1 & 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74

At the May 31, 1979 meeting with the NRC staff, certain plant specific information on the subject of unrestricted purging was requested. We have compiled these requests into a series of ten questions whose responses are provided below.

QUESTION NO. 1

What are the reasons for purging?

RESPONSE

Containment purge is normally required before and following planned or forced outages for repair and maintenance of equipment inside the containment. At the time of the outage the extent of the repairs and surveillance to be accomplished may not be known. Hence, the need for purging the containment and the length of the purge cannot be accurately predicted. Typically, the reasons for requesting a purge of the containment atmosphere are:

(a) levels of airborne radioactivity above the normal containment background, or
(b) elevated levels of mucous membrane (eye and upper respiratory tract) irritants, or
(c) application of engineering controls to limit potential airborne radioactive hazards.

These reasons vary and are dependent upon the operating mode of the plant and the reason and length of time for the outage. Unit repairs, maintenance and/or surveillance are not usually carried out during power operation (Modes 1 and 2). However, on occasion we have had to purge at power. A total of approximately five hours of purge operation in Modes 1 and 2 have been accumulated since initial criticality of Unit 1 in 1975. Otherwise all of our purge operations have been done with the plant in a standby or shutdown condition.

QUESTION NO. 2

a) How is permission granted?

RESPONSE

At the request of the Shift Operating Engineer, the Chemistry Section takes samples of the containment upper and lower volumes and instrument room for analysis. The Radiation Protection Section then examines the results of the analysis and permission is then granted or refused by the Plant Radiation Protection Supervisor, his designee or the Plant Manager. This activity takes approximately eight hours to complete.

b) What procedures are in place?

RESPONSE

OHP 4021.028.005 "Operation of the Containment Purge System"

OHP 4021.028.010 "Instrument Room Purge"

12 THP 6020 LAB.038 "Techniques of Gaseous Sampling"

12 THP 6020 LAB.067 "Gas Sample Analysis"

c) Are our procedures slanted toward selecting purging as the primary relief method?

RESPONSE

No, our procedures require that the containment auxiliary cleanup system located in the lower volume be used to reduce the need for purging. This system (auxiliary cleanup system) is used for normal temperature/humidity control and when the radioactivity is too high to purge. The containment pressure relief system is used to maintain containment pressures within the limits of our Technical Specifications. The containment purge system is operated for the conditions described above in our response to Question No. 1.

QUESTION NO. 3

a) On Unit 1 you average about 120 hrs/yr purging in Modes 1, 2, 3, 4. How many purges, typically, account for this (one or many)?

RESPONSE

From 1975 through 1978 three to six purges were performed annually in Modes 1, 2, 3 and 4 on Unit 1.

b) Do we keep the purge system operating continuously while the containment is open?

RESPONSE

The fact that the containment is open has not changed the purging requirements. Normally when the containment is open an extended purge authorization is in effect and as such, during the time the containment is open, purge can be stopped or started as necessary.

QUESTION NO. 4

a) What is your estimate of the cost, in terms of additional time exposure to personnel, when needed maintenance in the containment is carried out in Modes 1, 2, 3, 4 without being able to purge?

RESPONSE

A comparison between Unit 1 and Unit 2 personnel exposures cannot be accurate because of such low airborne radioactivity in Unit 2. However, Unit 2 has experienced serious levels of mucous membrane irritants, requiring that respiratory protective equipment be worn. Some individuals have become sick due to these irritants. The ability to purge Unit 2 containment would have alleviated the personnel irritation and increased work efficiency. In turn this would reduce personnel exposure to external radiation and be consistent with the ALARA program.

If the airborne radioactive hazards increase to the point at which use of Self Contained Breathing Apparatus (SCBA) is required, many areas of the lower containment and the pipe annulus become inaccessible due to the close quarters. Entry into or exit from the ice condenser might frost the lens making work there impossible or very difficult. A 30 minute service life of the SCBA would also require more work stoppages for exit and re-entry with a fully charged air bottle. At the present time SCBA's are used only as emergency equipment, not for routine work.

Without ability to purge in Modes 1, 2, 3 and 4 personnel exposure can be expected to increase. The magnitude of the increase cannot be predicted at this time. By lowering levels of airborne hazards, radioactive and non-radioactive, through the use of engineering controls, greater flexibility of personnel exposure can be achieved.

b) Please indicate typical dose rates in the upper and lower volumes at full power operation.

RESPONSE

During power operation of both Units 1 and 2, the upper containment, upper ice condenser and the in-core instrument room/pipe annulus are frequently entered for inspection and minor maintenance. The lower containment is not accessible during power operation. Typical radiation levels at 100% power in the upper containment range from $<.1$ mrem/hr to 25 mrem/hr, and in the upper ice condenser <0.1 mrem/hr. Typical radiation levels in the pipe annulus at 100% power range from <5 mrem/hr to 90 mrem/hr, and in the in-core instrument room <5 mrem/hr. It should be noted that these levels are from mixed sources, not submersion doses due to radioactive noble gases.

Unit 1 operation history up to this point in time has not shown high levels (>1 MPC) of airborne radioactive hazard, specifically I-131. Unit 2 has occasionally had traces of I-131.

QUESTION NO. 5

Please indicate typical temperatures and humidities in both parts of the containment in summer and winter.

RESPONSE

Typical temperatures and humidities in the upper and lower containments are listed below for various winter and summer months.

Unit 1 Upper Containment

Month	Temperature (^{o}F)	Relative Humidity (%)
January	69	42
February	72	43
March	71	38
June	78	81
July	75	90
August	83	74

Unit 1 Lower Containment

Month	Temperature (^{o}F)	Relative Humidity (%)
January	67	44
February	69	48
March	68	42
June	84	67
July	94	49
August	102	40

Unit 2 Upper Containment

Month	Temperature (^{o}F)	Relative Humidity (%)
November	70	33
December	72	37
June	76	58
July	78	54
August	83	54

Unit 2 Lower Containment

Month	Temperature (^{o}F)	Relative Humidity (%)
November	66	38
December	72	36
June	88	39
July	92	35
August	99	32

QUESTION NO. 6

Have we had any instance in which the inability to purge has forced Unit 2 to be brought to Mode 5? If so, for how long?

RESPONSE

No, since purging of the Unit 2 containment has always been restricted to Mode 5 or 6 in accordance with Technical Specification 3/4 6.1.7. A one-time exemption to allow purging in Mode 4 was granted by the NRC in July 1978. The inability to purge the containment in Mode 4 for the July 1978 outage would have forced Unit 2 to be brought to Mode 5. This outage lasted approximately 240 hours. If we were not allowed to purge the containment in Mode 4, we would have had to restart the plant from Mode 5 instead of Mode 4 which would have further extended the length of the outage. Purging the Unit 2 containment is usually scheduled for Mode 5 outages since we are not allowed to purge the containment in Modes 1, 2, 3 and 4.

QUESTION NO. 7

Is the containment cleanup system operating continuously when the units are at power (Modes 1 and 2)?

RESPONSE

No, the lower containment auxiliary charcoal filter cleanup system is used as necessary to control and maintain temperature, humidity and airborne radioactivity inside the containment during power operation within the specified limits.

QUESTION NO. 8

Please provide a cost estimate of the impact of not being able to purge. (Unit 1 vs. Unit 2)

RESPONSE

Maintenance, repair and surveillance activities inside the containment are not usually conducted in Modes 1 and 2. The inability to purge largely impacts us in Mode 3 and Mode 4. The largest expense of not being able to purge in Mode 3 or Mode 4 would be the cost of the replacement electrical generation for the time to go from Mode 3 to Mode 5, and to return from Mode 5 to Mode 3. Records show that it requires approximately eight hours to go from Mode 3 to 5, and twenty-four (24) hours to go from Mode 5 to Mode 3. This would mean an additional thirty-two (32) hours of electrical generation lost if work in the containment required operation of the purge system. This lost generation of electricity from one Unit of Cook Plant for 32 hours costs approximately $310,000 in replacement electrical generation.* In addition to replacement generation, the additional manhours required to change modes would also be an expense which would be incurred and is not included in this cost. The cost of man-rem exposure incurred by not being able to purge the containment for these activities is also not included.

* This cost is based on 1978 fossil vs. nuclear

QUESTION NO. 9

In view of your experience what is the bare minimum number of hours of unrestricted purge?

RESPONSE

Based on our Unit 1 experience while in Modes 1, 2, 3 and 4, a purge operation time of 120 hours per year is minimum. At present, Unit 1 is administratively restricted in Modes 1, 2, 3 and 4 to 90 hours per year; Unit 2 is not allowed purge operation while in Modes 1, 2, 3 and 4. Our Technical Specifications allow us to use the containment pressure relief system under administrative control to keep containment pressures within the Technical Specification limits. The operation time of this system is excluded from the above restrictions.

QUESTION NO. 10

What is the approximate cost of the modifications that were made to the purge valves?

RESPONSE

The approximate cost of the materials, labor, engineering, and design to modify the purge valves in accordance with our response to Branch Technical Position CSB 6-4 and past submittals on this matter are:

(a) for Unit 1, approximately $80,000

(b) for Unit 2, approximately $63,000

The primary reason for the different costs is the increased labor cost for the Unit 1 work. These cost estimates do not include the cost of the modifications made to the purge valve circuits, described in our June 8, 1979 letter (AEP:NRC:00114A) nor the cost of man-rem exposure incurred while performing the work.