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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards addl info to util 810424 submittal re distributed ignition sys testing & operation & proposed Tech Specs & preinstallation testing description of glow plug ignitors, in response to NRC 810319 request.

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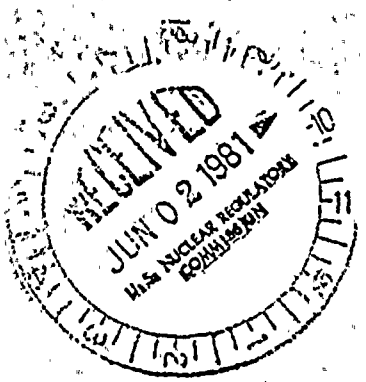
May 29, 1981
AEP:NRC:00500C



Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
Supplementary Information to AEP:NRC:00500A

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

Dear Mr. Denton:

This letter and its attachments provide additional information to our AEP:NRC:00500A submittal dated April 24, 1981 as per the request made by members of your staff during a telephone conversation held on May 19, 1981. In the attachments to this letter, supplementary information is included on the operation voltage and actuation procedures of the DIS, the proposed Technical Specifications and pre-installation testing description of the glow plug igniters. The proposed Technical Specifications have been reviewed and approved by the Plant Nuclear Safety Review Committee and will be reviewed by the AEPSC Nuclear Safety and Design Review Committee at its next meeting to be held on June 9, 1981. The potential for leakage flow into the instrument room is further addressed. Finally, a discussion on the containment air re-circulation fan survivability and on the possibility of ice condenser insulation degradation are also presented in the attachments.

As committed to in our letter to you of April 24, 1981, No. AEP:NRC:0500A, the distributed ignition system installed in Cook Unit 2 will be fully operational by June 1, 1981.

Very truly yours,

A001
S
1/1

R. S. Hunter
Vice President

/os

(cc: attached)

8106030203
P

cc: John E. Dolan - Columbus
R. W. Jurgensen
R. C. Callen
G. Charnoff
D. V. Shaller - Bridgman
Region III Site Inspector - Bridgman

DONALD C. COOK NUCLEAR PLANT UNIT NOS. 1 AND 2

ATTACHMENT NO. 1 TO AEP:NRC:00500C

1.0 Distributed Ignition System Testing and Operation

1.1 Preoperational Testing

The Distributed Ignition System (DIS) will be operated at 14 V ac. An extensive pre-operational test program was undertaken to ensure that all glow plug igniters being installed in the Cook Units were capable of achieving and maintaining a surface temperature of 1550°F or greater at 14 V ac operation. A description of the test program and a discussion of the test results follow.

A total of two hundred and eighteen (218) GM AC glow plug igniters were purchased and tested; one hundred and thirty six (136) of which, sixty eight (68) per unit, have or will be installed as part of the Cook Plant's DIS. A screening test was performed on all the igniters so as to eliminate the potential for installation of defective plugs. The screening test consisted of energizing the igniters for approximately fifteen (15) minutes at 3, 6, and 9 V ac followed by operation at 14 V ac for approximately four hours and fifteen minutes (total test time is five hours). Glow plug surface temperature was monitored using an optical pyrometer during the 14 V ac operation.

One hundred and eighty four (184) of the glow plug igniters successfully passed the screening test. A random sample of twenty igniters was selected from this group and energized for approximately forty seven (47) hours at 14 V ac (no pre-warming of the igniters was performed). All twenty igniters successfully passed this endurance test with a surface temperature in the range of 1900-2000°F. The remaining one hundred and sixty four (164) igniters were energized at 14 V ac directly (no pre-warming) for approximately eight hours. All of these igniters successfully passed this eight hour test and exhibited a surface temperature in the range of 1900-2000°F.

Subsequent to installation, the DIS was further tested by energizing the supply breakers and measuring the voltage and amperage for the igniter groups. The igniters were visually inspected to verify proper operation (at surface temperatures in the range of 1900-2000°F the igniter glows a bright red).

1.2 Periodic Testing

Proposed Technical Specifications for the DIS are contained in Attachment No. 2 to this submittal. Testing of the DIS will be accomplished by energizing the igniter groups and verifying that the voltage and amperage measurements taken during the test are similar to the measurements taken during pre-operational testing of the system.

Eighteen month surveillance will verify energization of the igniter through visual observation of the glow plug.

1.3 Actuation Criteria

The DIS is designed to provide additional hydrogen control capability in the unlikely event of a degraded core cooling event involving the generation and release into containment of substantive amounts of hydrogen. Conservative analyses of the containment response to deliberate hydrogen combustion have been performed utilizing the Westinghouse/Offshore Power System's (W/OPS) CLASIX computer code. The results of these analyses clearly reflect the ability of the DIS, in conjunction with operation of the Containment Air Recirculation/Hydrogen Skimmer System (HYS) and the Containment Spray System (CTS), to provide adequate control for a S_2D event resulting in (approximately) eighty percent (80%) clad oxidation.

The W/OPS analysis of the S_2D event shows that Automatic Phase 'B' isolation would occur prior to the onset of hydrogen combustion. Phase 'B' containment isolation results in actuation of those systems, CTS and HYS, which are required to operate in conjunction with the DIS. Therefore, the DIS will be actuated subsequent to the receipt of an automatic Phase 'B' isolation signal. Operation of the DIS is accomplished by the use of four manual switches, two per train, located in the main control room.

2.0 Instrument Room Isolation

In our AEP:NRC:00500A submittal we stated that our preliminary review indicated that communication between the instrument room and other lower containment volume compartments was limited to the path through the hydrogen skimmer duct work and to potential in-leakage. Further review of this matter has revealed several pipe sleeves which are not sealed and a connection between the instrument room sump drain line and the pipe tunnel sump (2.5" diameter). These small openings would provide paths for limited communication between the instrument room and the other lower volume compartments. We are continuing to review the necessity, or lack thereof, of installing igniters in this area. We anticipate completion of our review prior to June 30, 1981.

3.0 Containment Air Recirculation/Hydrogen Skimmer Fan

The survival of the containment air recirculation fans depends on the magnitude of the pressure differential which may be imposed across the fan in the event of an upper compartment hydrogen burn. CLASIX results reported in AEP's earlier submittal AEP:NRC:0500 predicts a number of burns in the upper compartment. However, recent results of Sequoyah and McGuire analyses, obtained from the modified version of the CLASIX code, demonstrate that hydrogen combustions occur primarily in the upper plenum of the ice-condenser and a number of them in the lower compartment.

The Cook specific CLASIX calculations will be done by OPS in the near future and as soon as the results become available, a final evaluation of the fans will be completed and the results submitted to the staff. We anticipate transmitting the results of our evaluation to you by June 30, 1981.

4.0 Ice Condenser Insulation

The ice condensers in Cook Units 1 and 2 are very similar to those in McGuire and Sequoyah; the one difference which has been identified to be significant in the analysis of insulation degradation pertains to the type of insulation employed. Unlike McGuire or Sequoyah, which employ polyurethane foam, encapsulated fiberglass insulation is used at the Cook Plant. The insulation is covered by galvanized steel sheets with joints between panels sealed to prevent vapor penetration. The casing material used to encapsulate the fiberglass is reported to be made of 6 mil polyethylene.

Based on the heat transfer calculations performed on insulation heat-up for McGuire by Duke Power, the temperature of the surface adjacent to the insulation is estimated to be about 370°F; the average insulation temperature is approximately 265°F. Since the ice-condenser air duct configuration at Cook is comparable to McGuire's, the results reported by Duke are generally applicable to Cook.

Since fiberglass exhibits very stable material characteristics even at high temperatures, its degradation is not anticipated when exposed to thermal environments predicted by Duke Power.

According to Reference 1 polyethylene starts melting at 300°F and at about 600°F decomposition occurs. The energy content of polyethylene is reportedly somewhat higher than that of polyurethane, (20,000 $\frac{\text{Btu}}{\text{lb}}$ for polyethylene vs. 12,000 $\frac{\text{Btu}}{\text{lb}}$ for polyurethane).[2] Preliminary estimate on the total volume of this material used in each units ice-condenser indicates that only a very small amount of polyethylene is present as part of the insulation panels; and thus the total energy content of this material inside the ice-condenser is not expected to exceed that of the intermediate deck doors calculated by Duke Power.

Therefore, based on analysis of the environment to which the insulation is exposed, it is unlikely that significant degradation of the polyethylene will occur; moreover, even in the event that all the polyethylene is decomposed, preliminary calculations indicate that this only constitutes a minuscule fraction of the energy generated from hydrogen combustion. Final results of the detailed study on the potential and impacts of insulation degradation in the Cook Plant ice-condensers will be submitted by June 30, 1981.

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REFERENCES

1. Private Communication, T. McLaughlin of Dupont to K. K. Shiu of AEP, May, 1981

2. Private Communication,.P. S. Cardello of Continental Wire & Cable Co. to T. E. King of AEP, January 17, 1977.