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October 5, 1978  
AEP:NRC:00095

Donald C. Cook Nuclear Plant Unit No. 2  
Docket No. 50-316  
License DPR No. 74  
Qualification Testing Of Barton Transmitters

REGULATORY DOCKET FILE COPY

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

References: AEP:NRC:00058  
AEP:NRC:00075

Dear Mr. Denton:

Please be advised that the Westinghouse Electric Corporation is transmitting the following documents to you under separate cover. (Westinghouse Letter NS-TMA-1950, dated September 29, 1978).

1. Forty (40) copies of a proprietary report entitled, "Qualification Testing of Barton Pressure and Differential Pressure Transmitters."
2. Twenty (20) copies of the non proprietary version of the report "Qualification Testing of Barton Pressure and Differential Pressure Transmitters."

The above documents, submitted at the request of your staff, contain reports on the seismic and environmental qualification tests on Barton Transmitters.

This letter authorizes the incorporation of the above documents under the Docket number, 50-316, for Unit No. 2 of the Donald C. Cook Nuclear Plant, and is submitted in fulfillment of License Condition 4.B of Amendment No. 6 to the D. C. Cook Unit No. 2 Operating License.

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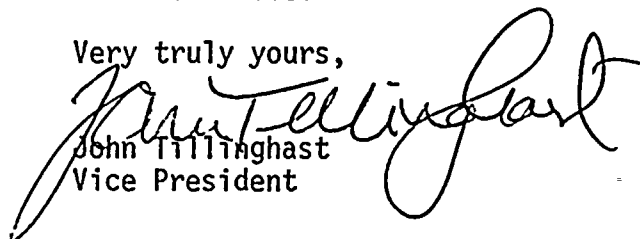
Mr. Harold R. Denton

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AEP:NRC:00095

The remedial operator actions set forth in our previous transmittals to the NRC, AEP Letter Numbers AEP:NRC:00058 and AEP:NRC:00075, will remain in effect pending NRC staff review and approval of the documents transmitted to you in the Westinghouse letter mentioned above.

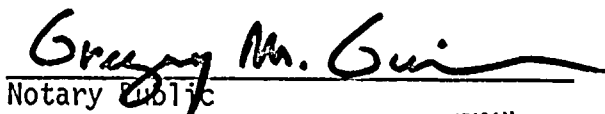
Very truly yours,



John Tillinghast  
Vice President

JT:em

Sworn and subscribed to before  
me this 5<sup>th</sup> day of October 1978 in  
New York County, New York

  
Notary Public

GREGORY M. GURICAN  
Notary Public, State of New York  
No. 31-4643431  
Qualified in New York County  
Commission Expires March 30, 1979

cc: R. C. Callen  
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ATTACHMENT TO AEP:NRC: 00075

SAFETY EVALUATION OF THE EFFECTS OF  
ENVIRONMENTAL INACCURACIES OBSERVED IN QUALIFICATION  
TESTING OF BARTON TRANSMITTERS ON OPERATION OF  
DONALD C. COOK NUCLEAR PLANT UNIT NO. 2

A. INTRODUCTION

During qualification testing of the Barton (763) Pressure Transmitters and Barton (764) Differential Pressure Transmitters, environmental inaccuracies were observed that were, in some cases, in excess of the acceptance criteria and allowances that had previously been made in plant safety analyses. The results of the Barton Qualification Tests were discussed in the previous transmittal to the NRC, Westinghouse letter NS-TMA-1870, dated July 21, 1978, and other transmittals referenced therein. The following safety evaluation demonstrates that even with the actual environmental inaccuracies observed during qualification tests, the plant safety analysis is not affected, and the previous conclusions remain valid. a,c  
a,c

B. INSTRUMENT APPLICATION

For D.C. Cook Unit 2 the Barton Model (763) pressure transmitter is installed in the Reactor Coolant System Wide Range pressure function (monitoring). The Barton Model (764) differential pressure transmitter is installed in the Pressurizer Level function (trip actuation and monitoring) and the Narrow Range Steam Generator Level function (trip actuation and monitoring). a,c  
a,c

C. TRIP ACTUATION OF AUTOMATIC PROTECTIVE FUNCTION

The Barton transmitters installed in D.C. Cook Unit 2 used for trip actuation are those in the Pressurizer Level function and the Narrow Range Steam Generator Level function. Since these transmitters met the acceptance criteria for trip actuation in the qualification tests, there is no effect on the safety analysis.

D. MONITORING INSTRUMENTS AND OPERATOR ACTION

1. LOCA

After automatic protective functions have occurred, the operator must diagnose whether the incident is a primary or secondary side break. The diagnosis is based on the steam pressure function, which utilizes 'out-of-containment'



instrumentation. Abnormally low steam pressure in one or more steam generators is indicative of a secondary side break, while normal steam pressure or increasing steam pressure in one or more steam generators is indicative of a primary side break (LOCA or steam generator tube rupture, respectively). Once it has been determined that the incident is a primary system rupture, the operator will identify a LOCA by indication of increasing containment pressure (or leak detection instrumentation for very small breaks), and a steam generator tube rupture by alarms from the steam system radiation monitors. The Barton transmitters installed in D.C. Cook Unit 2 are not utilized in these diagnostic procedures, and thus the Barton transmitter qualification test results have no impact on them.

After the LOCA has been diagnosed, the operator is required only to realign the ECCS system to the Cold Leg (and eventually to the Hot Leg) Recirculation mode. Switchover to Cold Leg Recirculation is initiated on receipt of the RWST low level alarm given by the RWST Level function. Since the Barton transmitters installed in D.C. Cook Unit 2 are not used in the RWST Level function, the Barton qualification test results have no impact on this operator action.

For very small LOCA's level may return to the pressurizer after a long time (on the order of 24 hours). The operator would then control pressurizer level by modulating the safety injection flow. Barton transmitter qualification test results demonstrate that the transmitters installed in the Pressurizer Level function for D.C. Cook Unit 2 will be stabilized within the acceptance criteria well before that time and will be available for the operator to control pressurizer level.

## 2. SECONDARY SYSTEM RUPTURE

After a secondary system rupture has been diagnosed (see D.1 above), the operator will proceed to isolate the faulted steam generator by terminating steam flow and main and auxiliary feedwater flow. When indicated level exists in the pressurizer, the operator will terminate high head charging and safety injection flow to the Reactor Coolant System. Auxiliary feedwater to the intact steam generators will be terminated when Steam Generator Narrow Range Level indication is obtained. For D.C. Cook Unit 2, these actions are taken based on the Barton Pressurizer Level and Narrow Range Steam Generator Level transmitters. Since the



qualification test conditions were selected to envelope temperature and radiation levels from all postulated design basis events, it is not likely that the inaccuracies observed in the qualification tests would be experienced under the conditions resulting from a secondary line rupture. Tests on unirradiated transmitters (more representative of what would be expected following a secondary line rupture) showed that the transmitters were well within the acceptance criteria. Nevertheless, in order to conservatively evaluate plant safety, a fracture mechanics analyses of the double ended steamline rupture was performed assuming Reactor Coolant System pressure was constant at the safety valve setpoint. The results of this analysis demonstrated that reactor vessel integrity is assured under these conditions for in excess of one effective full power year, during which time this issue of environmental inaccuracies should be resolved. Once the primary and secondary system temperatures have stabilized, the operator has the option of maintaining the plant in the safe hot shutdown condition, or proceeding to cold shutdown. To cool down and go into RHR system cooling for cold shutdown, the operator will use the Reactor Coolant System Wide Range Pressure transmitters. In view of the results of the Barton transmitter qualification testing, Westinghouse has recommended that a period of several hours be allowed to elapse and that the operator verify the Reactor Coolant System Wide Range Pressure reading with another instrument from which reactor coolant system pressure can be evaluated. The Barton transmitter qualification test results demonstrate that after several hours, the pressure transmitters are stabilized within the acceptance criteria for monitoring. This recommendation is an interim measure taken to assure that the RHR system could not be overpressurized under these conditions, until such time as the issue of environmental inaccuracies is resolved.

The emergency operating procedures for secondary side breaks have temporarily been modified to instruct the operator to maintain the unit in Mode 4, Hot Shutdown, for a period of two hours, and to then verify Reactor Coolant System pressure using an outside source prior to proceeding with plant cooldown. The outside source to be monitored is charging pump header pressure. The charging pump header pressure is a conservative measure of the actual RCS pressure due to the fact that the header pressure is equal to the actual RCS pressure plus the pressure drop in the charging line between the pressure indicator and the RCS injection point.



Charging pump header pressure is monitored using a Foxboro Model EllGH Full Range (0-3000 psig) Pressure Transmitter. The Foxboro Model EllGH Pressure Transmitter is a seismic Category I instrument with surveillance requirements consistent with the surveillance requirements for ESF instrumentation (e.g., channel calibration once per every 18 months). The said instrument has been calibrated over the full range of instrument span (0-3000 psig) with a maximum loop deviation of  $\pm 2\%$ .

E. CONCLUSION

Based on the evaluation presented above, it is concluded that accounting for the inaccuracies observed during the qualification testing of the Barton (763) pressure transmitters and the Barton (764) differential pressure transmitters, the safety analysis for D.C. Cook Unit 2 remain valid, and information is available to the operator to perform the necessary diagnostic functions and take the required manual actions following a LOCA or secondary system rupture.

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