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782070009

60



NS-TMA-1870

Westinghouse
Electric Corporation

Water Reactor
Divisions

PWR Systems Division

Box 355
Pittsburgh Pennsylvania 15230

July 21, 1978

NS-PLC-5256

S.O. AMP-460

Ref: NS-TMA-1771, 4/26/78
AEW-7111, 4/3/78

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20014

REGULATORY DOCKET FILE COPY

RECEIVED DISTRIBUTION
SERVICES UNIT

Dear Mr. Denton:

AMERICAN ELECTRIC POWER PROJECTS
DONALD C. COOK UNIT 2 (DOCKET 50-316)
ENVIRONMENTAL QUALIFICATION OF BARTON TRANSMITTERS

Enclosed are:

- X 1. Twenty-five (25) copies of two Westinghouse letters to American Electric Power on Environmental Qualification of Safety Related Barton Instruments (Proprietary).
- 2. Forty (40) copies of two Westinghouse letters to American Electric Power on Environmental Qualification of Safety Related Barton Instruments (Non-Proprietary).

Also enclosed are:

- X 1. One (1) copy of Application for Withholding, AW-78-56, (Non-Proprietary).
- X 2. One (1) copy of Application for Withholding and Affidavit (Non-Proprietary), AW-76-39.

This information is being submitted to the NRC at the request of your staff and reports on the recent testing of Barton transmitters. The attached two Westinghouse letters 1) AEW-7156, 7/17/78, M. H. Judkis to R. W. Jurgensen 2) AEW-7157, 7/20/78, M. H. Judkis to R. W. Jurgensen provide an updating of testing previously described in the referenced letter to you.

By a separate letter, American Electric Power Service Corporation is authorizing this submittal on their docket no. 50-316.

This submittal contains proprietary information of Westinghouse Electric Corporation. In conformance with the requirements of 10CFR Section 2.790, as amended, of the Commission's regulations, we are enclosing with this submittal an application for withholding from public disclosure and an affidavit. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission.

782070009

NS-TMA-1870
July 19, 1978
Page 2

Correspondence with respect to the affidavit or application for withholding should reference AW-78-56 and should be addressed to R. A. Wiesemann, Manager of Licensing Programs, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pa. 15230

Very truly yours,



T. M. Anderson, Manager
Nuclear Safety Department



I. C. Ratsep/fk
Attachment

cc: R. W. Jurgensen, 1L, (AEP) 1A, (5P, 1NP)
R. F. Hering, 1L (AEP)
S. H. Horowitz, 1L, (AEP)
S. J. Milioti, 1L (AEP)
J. G. Feinstein, 1L (AEP) 1AP



Westinghouse
Electric Corporation

Power Systems
Company

PWR Systems Division

Box 355
Pittsburgh, Pennsylvania 15230

AEW-7157
July 20, 1978
S.O. AMP-325
REF: AEW-7156

Mr. R. W. Jurgensen, Head
Nuclear Engineering Division
American Electric Power Service Corporation
2-Broadway
New York, New York 10004

AMERICAN ELECTRIC POWER PROJECT
DONALD C. COOK UNIT 2
ENVIRONMENTAL QUALIFICATION OF BARTON TRANSMITTERS

Dear Mr. Jurgensen:

In the referenced letter Westinghouse provided a summary of the sequential (radiation, seismic, temperature/pressure/chemical spray) environmental test results of the subject Barton pressure and differential pressure transmitters. We indicated that during part of the temperature/pressure/chemical spray testing the instruments exceeded their specifications; however, as outlined in the referenced letter, the test conditions were not representative of any single postulated event and Westinghouse was initiating several short term programs to verify the adequacy of the transmitters.

To demonstrate that the large ()^{b,c} deviations observed during the sequential testing would not occur under the concurrent radiation/temperature conditions that would exist during postulated accidents Westinghouse recently completed a simultaneous radiation/temperature test on a Barton Model ()^{a,c} differential pressure transmitter. The transmitter used was the one described in the referenced letter as an unirradiated instrument having undergone the short term portion of the temperature/pressure/chemical spray test. The concurrent radiation/temperature test consisted of placing the unit in an oven near a radiation source and simultaneously exposing the transmitter to temperature and radiation. The transmitter was installed in the oven with its cover removed in an attempt to simulate the same temperature rise on the circuit board as seen during the steam test. By removing the transmitter cover the electronics would heat up at a rate approximating the air temperature. On the other hand the heat up of the differential pressure sensing cell would lag the electronics due to the thermal inertia of the unit and the energy content of the air. This is opposite of the situation involving a steam test with the cover in place and consequently ()^{b,c} errors at the beginning of the test would be expected due to early actuation of the temperature compensation circuitry. Since the oven temperature could not be raised at a rapid rate it was preheated to ~ ()°F^{b,c} prior to raising the radiation source from its pool.

July 20, 1978

Once the oven had been preheated to $\sim ()^{\circ}\text{F}_{b,c}$, the radiation source was raised providing a dose rate of $\sim ()^{\circ}\text{F}_{b,c}$ rads/hour. Over the first $()^{\circ}\text{F}_{b,c}$ minutes of the test the oven temperature attained $\sim ()^{\circ}\text{F}_{b,c}$ and the expected $()^{\circ}\text{F}_{b,c}$ offset was seen. At $()^{\circ}\text{F}_{b,c}$ minutes into the test the oven attained $\sim ()^{\circ}\text{F}_{b,c}$ and remained at this level for about $()^{\circ}\text{F}_{b,c}$ minutes. During this period of time the transmitter error went $()^{\circ}\text{F}_{b,c}$ but did not go beyond $\sim ()^{\circ}\text{F}_{b,c}$ span. The transmitter recovered to $()^{\circ}\text{F}_{b,c}$ span at approximately $()^{\circ}\text{F}_{b,c}$ hours into the test and remained within $()^{\circ}\text{F}_{b,c}$ to $()^{\circ}\text{F}_{b,c}$ to the completion of the test (at $\sim ()^{\circ}\text{F}_{b,c}$ hours). Due to the slow cooling of the oven, the temperature did not decrease below $\sim ()^{\circ}\text{F}_{b,c}$ after the $()^{\circ}\text{F}_{b,c}$ minute, $()^{\circ}\text{F}_{b,c}$ condition.

Results of this test support the contention that under simultaneous testing the effects observed under sequential testing would not be observed (maximum error of $\sim ()^{\circ}\text{F}_{b,c}$ span during the simultaneous test as compared to $\sim ()^{\circ}\text{F}_{b,c}$ span under sequential testing).

As outlined in the referenced letter additional testing to determine the dose level at which radiation damage occurs and to determine the temperature at which the characteristic $()^{\circ}\text{F}_{b,c}$ offset is triggered is in process. We will keep you informed of these results when they become available. The above data concerning the transmitter testing are Westinghouse proprietary information and are for your internal use only and should not be released to any persons or other organizations without prior approval of Westinghouse Electric Corporation. If you have any questions concerning the above, do not hesitate to contact us.

Very truly yours,



M. H. Judkis, Manager
American Electric Power Project

WGJ/lz/keg

cc: Mr. R. W. Jurgensen - 5L
Mr. R. F. Hering - 1L
Mr. S. H. Horowitz - 1L
Mr. J. C. Jeffery - 1L
Mr. J. G. Feinstein - 1L

Westinghouse
Electric Corporation

Water Reactor
Divisions

PWR Systems Division

Box 355
Pittsburgh, Pennsylvania 15230

July 17, 1978

S.O. No.: AMP-325

Ref: AEW 7026

Mr. R. W. Jurgensen, Head
Nuclear Engineering Division
American Electric Power Service Corporation
2 Broadway
New York, New York 10004

AMERICAN ELECTRIC POWER PROJECT

Donald C. Cook Unit 2

Environmental Qualification of Barton Transmitters

Dear Mr. Jurgensen:

In the referenced letter Westinghouse provided an update of the Seismic and Environmental Supplemental Qualification Program and, in particular, instrument qualification. Included in the letter were Westinghouse recommendations for the replacement of installed transmitters with adequately qualified instruments. These recommendations were the result of our review of prior transmitter qualification tests, the supplemental program qualification tests and the instrument functional requirements.

As described in the letter Westinghouse, in conjunction with Barton, had developed modified pressure and differential pressure transmitters to perform adequately under the test conditions established for the qualification program. At that time temperature/pressure/chemical testing had been performed on prototypes of these modified instruments and test results submitted to the NRC via Westinghouse generic letter reports. Following the successful completion of these prototype tests, Barton initiated procurement of components and building of transmitters. In April of this year Westinghouse initiated the qualification and lot verification testing on a sample (three pressure transmitters, Model [] a,c and three differential pressure transmitters, Model []) taken from lot 1.a,c. The testing included sequential radiation exposure followed by seismic simulation and finally temperature/pressure/chemical exposure. The radiation testing consisted of exposing the instruments to [] b,c total integrated dose at a rate of approximately [] per hour. b,c At an integrated dose of [] (the dose assumed to envelope the b,c radiation received by the instruments under postulated LOCA conditions in the time period for automatic protective function initiation) the transmitter error was ~ [] span. The error at [] total integrated dose was less than [] span. b,c b,c The seismic testing of these b,c irradiated transmitters consisted of multi-frequency biaxial seismic simulation with a broad band response spectra of [] times gravity []. b,c b,c Errors noted during the seismic testing were in most cases less than [] span. b,c

July 17, 1978

Autoclave testing (steam/pressure/chemical) began on the transmitters in mid June, 1978. Figure 1 provides the specified test conditions. Results of this testing included deviations in the output of the transmitters which exceeded the allowed test tolerances. When subjected to the test conditions the narrow range pressure transmitter (to be used to monitor pressurizer pressure for trip/safety injection function initiation) exhibited a maximum [] error of [] span that was out of specification (+10% span) for the first few minutes of the test (see figure 2). The wide range pressure transmitters, used to monitor reactor coolant system pressure, also exceeded their post accident monitoring specification of +10% span. As can be seen in Figure 2, these instruments did not go beyond approximately [] span at any point. The differential pressure transmitters, used for pressurizer level and steam generator level applications did not exceed the +10% span tolerance for automatic protective function initiation before going [] at approximately [] minutes into the test and remained outside of the specification for about [] hours (Figure 3). All test units (pressure and differential pressure) returned within specification, stabilized with an error of about [] span and successfully completed the accelerated long term monitoring portion of the test.

b,c b,c

b,c

b,c

b,c

b,c

To put the results in proper perspective the temperature/pressure/chemistry test conditions imposed on instruments that have been irradiated to a total integrated dose of [] are not representative of any single postulated event (loss of coolant accident or steamline break) since the total dose at the time the instrument would experience the postulated accident's steam/temperature transient would be several orders of magnitude less than the []. Westinghouse has initiated several short term programs, to be completed within the next few weeks, to demonstrate the adequacy of the transmitters. We have recently tested an unirradiated transmitter from lot one. Results showed a small initial deviation (see Figure 4) possessing the same characteristics of irradiated instrument testing. These data, along with other data from the supplier, indicate that damage induced by irradiation followed by temperature has a [] effect on the accuracy of the transmitters. Westinghouse is currently investigating the effect by: (1) determining the dose level at which radiation damage occurs by exposing amplifier circuits to varying dose levels and (2) by determining the temperature at which the characteristic effects are triggered. Also we will shortly be performing a simultaneous radiation/temperature test to demonstrate that the effect observed during sequential testing would not occur under concurrent radiation/temperature conditions that would be present during postulated accidents (especially loss of coolant accident).

b,c

b,c

b,c

While we believe that the above programs will demonstrate the adequacy of the transmitters and enable us to explain and properly evaluate the results observed in the qualification tests, Westinghouse has evaluated the impact of the results as they apply to the D. C. Cook Unit 2 plant. In our evaluation we reviewed the test results from the aspects of automatic protection function initiation and post event operator actions. With respect to automatic protective function initiation, it has been

July 17, 1978

determined that the observed test results do not invalidate the safety analysis results for steamline breaks, feedline breaks or loss of coolant accident analyses. With respect to operator actions following postulated in containment events, two activities for which in containment instrumentation is normally used on which to base operator action are impacted by the test results. The first of these concerns is terminating safety injection and auxiliary feedwater flow following a postulated steamline break to ensure that reactor vessel conditions are not exceeded. The operator would normally monitor RCS wide range temperature and pressure and pressurizer level and take action based on these signals. With the assumption that the current test results are applicable to this event the indicated pressure and level values could be much lower than actual values and consequently, pressure in the reactor coolant system could be greater than indicated. An evaluation of your vessel for the first full power year of operation shows that following such an event operation of the reactor coolant system at the pressurizer safety valve setpoint is acceptable for an extended period of time. Therefore any delayed action taken by the operator would have no adverse effect on the integrity of the reactor coolant system.

The second area reviewed concerned proceeding to cold shutdown following a secondary side break. Many plant emergency operating instructions state that the operator is to proceed to cold shutdown as soon as the plant conditions have stabilized. To do this the operator monitors wide range reactor coolant system pressure which is also interlocked with the RHR system valves. Once the reactor coolant system pressure is below a preset value the interlocks will be satisfied and the operator can align the RHR system to the RCS. If the results of the tests are applied to this situation and the actual RCS pressurizer is greater than indicated and the operator connects the RHR to the reactor coolant system the RHR system could be overpressurized. To prevent this situation from occurring Westinghouse recommends that the operating procedures be revised to maintain the plant in a hot shutdown condition, which is a safe shutdown condition, for an extended period of time (i.e., several hours). The attached test data demonstrates that during this period the transmitters will recover to an accuracy of [] span. At this point in time the operator should verify the reading of the wide range reactor coolant system instrument with another instrument from which reactor coolant system pressure can be evaluated, for example, this instrument could be a diverse incontainment reactor coolant system pressure instrument or an out of containment instrument such as charging pump discharge pressure. Following this point the operator can proceed to cold shutdown. It should be noted that this recommended revision is viewed as an interim procedure until the transmitter results can be evaluated in light of the short term programs previously described. b,c/

Although the transmitter test results exceeded our specifications for certain functions, Westinghouse is confident that the additional programs will confirm the adequacy of the Barton transmitter. The above data

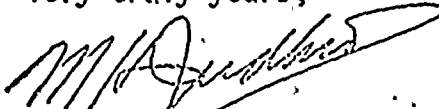
Mr. R. W. Jurgensen

-4-

July 17, 1978

concerning the transmitter testing, including the test conditions, and the attached figures are considered to be Westinghouse proprietary information and is for your internal use only and should not be released to any persons or other organizations without prior approval of Westinghouse Electric Corporation. If you have any questions concerning the above, do not hesitate to contact us.

Very truly yours,



M. H. Judd, Manager
American Electric Power Project

MHJ:mrr

cc: Mr. R. W. Jurgensen - 5L
Mr. R. F. Hering - 1L
Mr. S. H. Horowitz - 1L
Mr. J. C. Jeffery - 1L
Mr. J. G. Feinstein - 1L

Temperature ($^{\circ}\text{F}$)

TIME (Seconds)

b, c.

FIGURE 1.

K&E 10 X 10 TO 11 INCH AG 1320
7 X 10 IN. 1974
REUNION, WESSLER CO.

1ST TRIP TEST

AG-2,3,4

PRESSURE TRANSMITTERS.

T
(F)

b,c

Pressure (% Span)

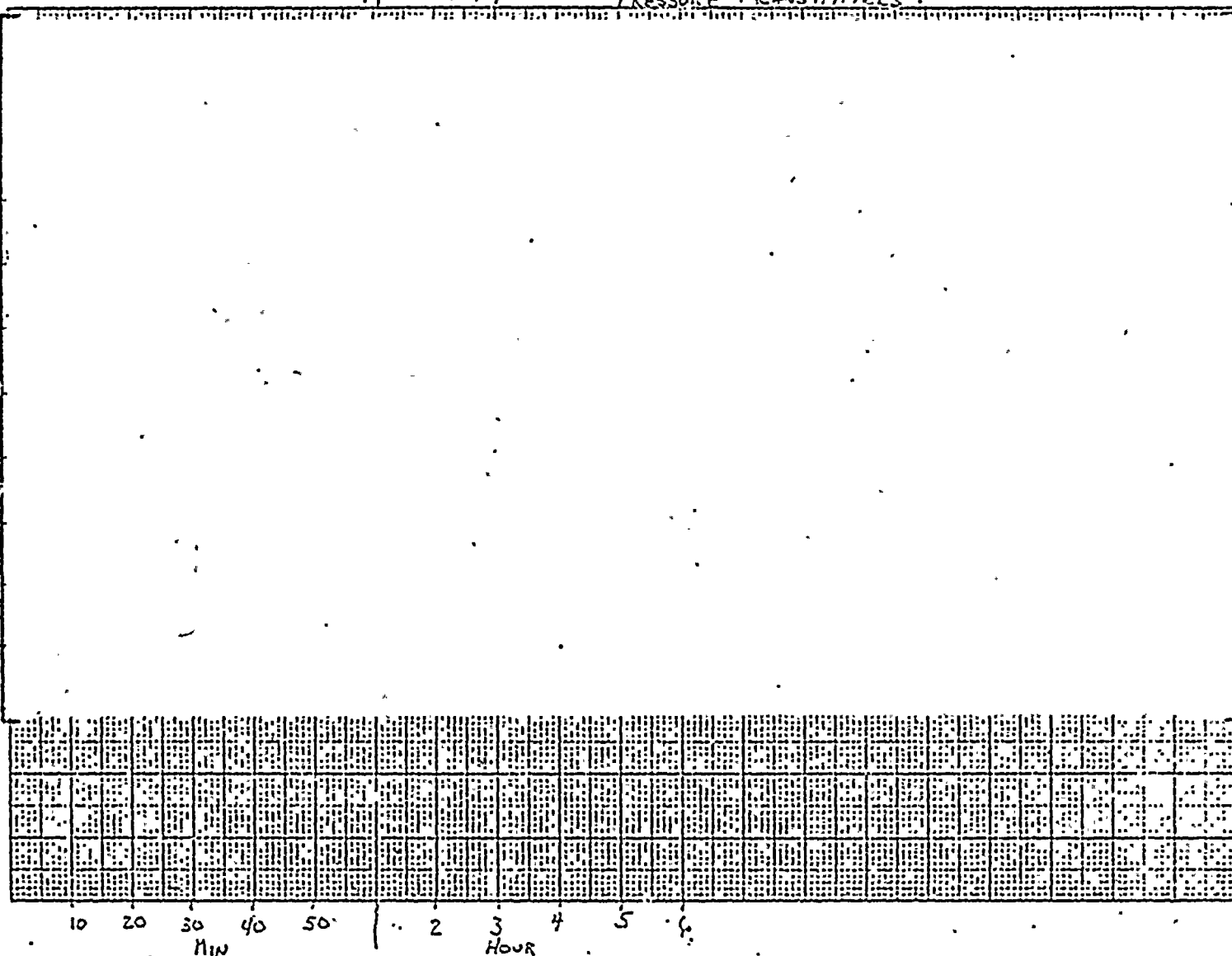


FIGURE 2

15 X 10 TO 15 INCH 4G 1320
7A INCHES
REVISED 1954

1ST TRIP TEST

T
(°F)

AR-1,2,3

DIFFERENTIAL PRESSURE TRANSMITTERS

b,c

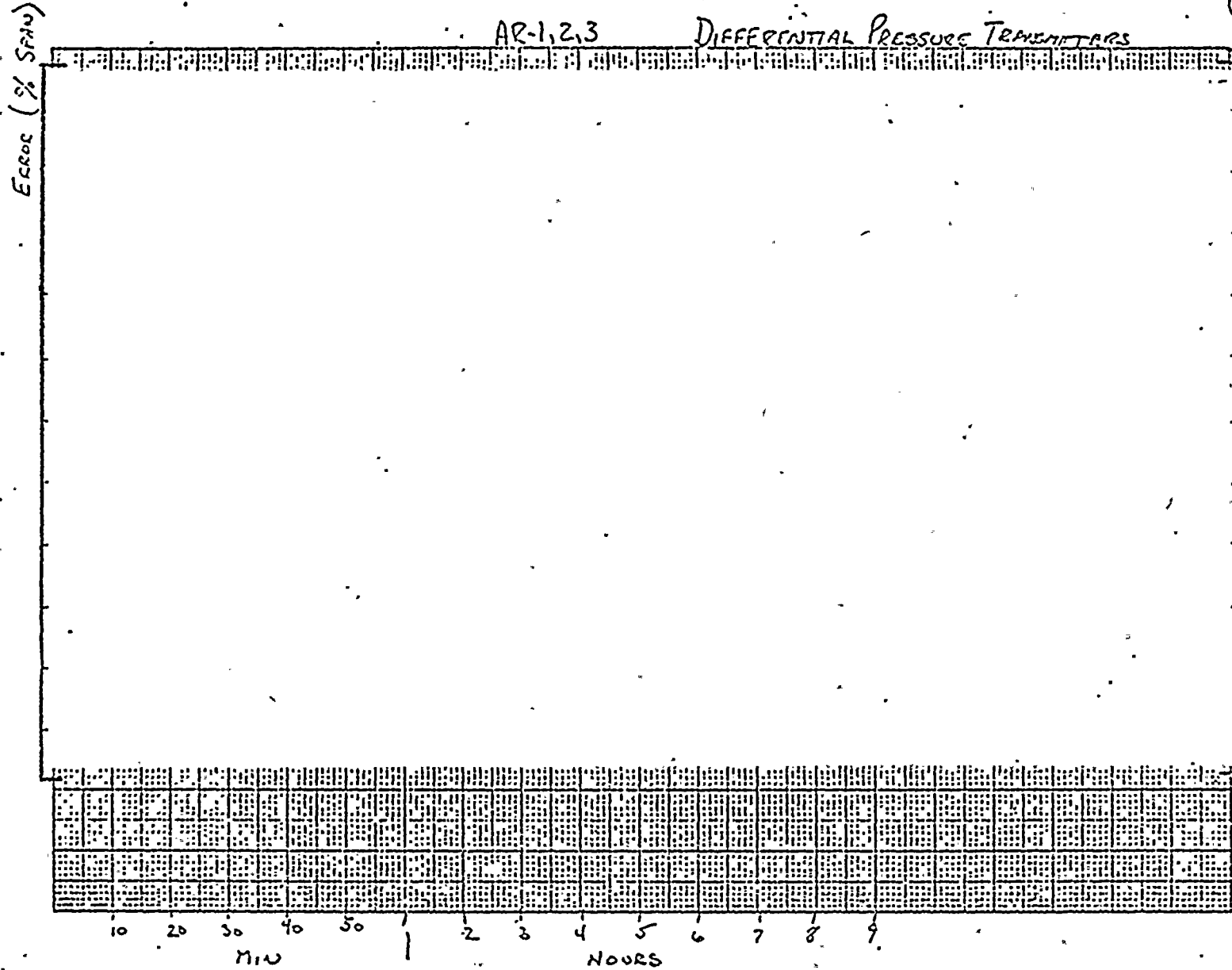


FIGURE 3

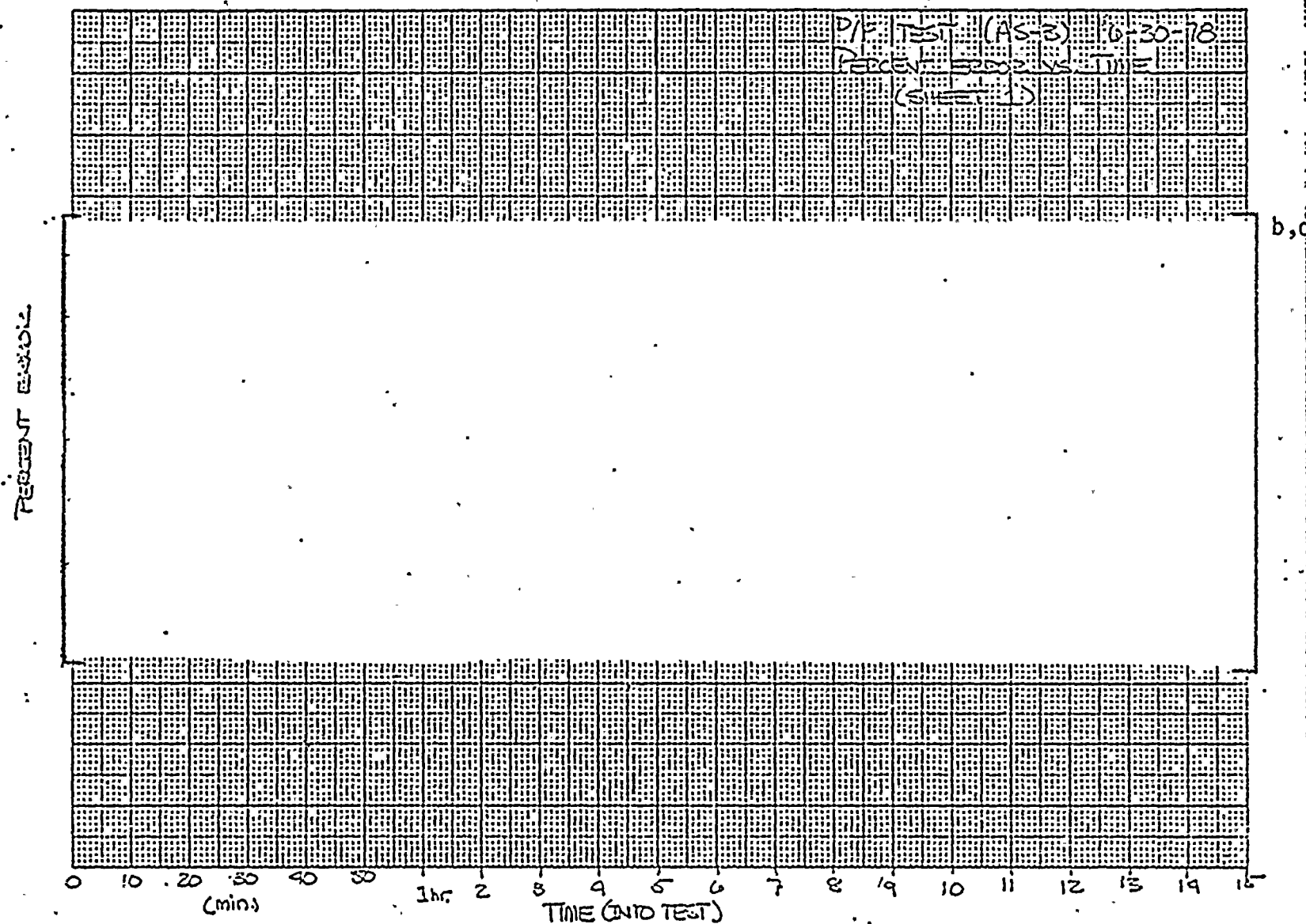


FIGURE 4

G 7/20/78

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LTR 1 ENCL 0

INFO RE MEETING BETWEEN LICENSEE MANAGMENT AND PLANT OPERATORS CONCERNING
REASONS FOR LARGE NBR OF EVENT REPTS AND NEW CONTROL PROCEDURES TO BE USED.

PLANT NAME: COOK -- UNIT 2

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D. Lankam

INDIANA & MICHIGAN POWER COMPANY

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June 30, 1978

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Donald C. Cook Nuclear Plant Unit 2
Docket No. 50-316
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Mr. J. G. Keppler, Regional Director
U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

REGULATORY DOCKET FILE COPY

Dear Jim:

A letter was sent to you yesterday by Mr. D. V. Shaller, Plant Manager of our Donald C. Cook Nuclear Plant, enclosing the Licensee Event Report for the incident which occurred on June 15, 1978 wherein both emergency diesel generators were inadvertently removed from service during maintenance. Our engineering staff in the American Electric Power Service Corp., including myself and John Dolan, worked with the plant staff management in formulating the corrective actions needed to prevent recurrence. I would like to personally supplement Mr. Shaller's report and give you a summary of the steps taken by management in the AEPSC to improve operating activities at the plant not only with respect to this event, but in the whole broad spectrum of plant operation now that both units are in service. I would like to point out that the suggestions of your staff, the meeting with you personally on June 16, and particularly our NRC resident inspector have been helpful to us as we formulated these intensified programs.

First, I went to the plant on April 23 and 24 to discuss with the plant management their problems and concerns. I was particularly interested in their views as to the reasons for

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June 30, 1978

the number of licensee event reports.

This was followed by a sequence of meetings on May 3 and 4 with broader participation by both plant supervisors and AEPSC engineering personnel. These meetings were conducted by the AEPSC Nuclear Safety and Design Review Subcommittee on Plant Occurrences and, in addition to myself, John Dolan our Senior Executive Vice President, Engineering and R. W. Jurgensen our Chief Nuclear Engineer, participated. As a result of the discussions at these meetings, a program of action was established. I am sure you would be interested in those actions we are taking which relate particularly to incidents of the kind experienced on June 15. These are broad policy considerations and are in addition to the specific items referred to in Mr. Shaller's letter.

1. Personnel Attitudes

The Plant Manager has had meetings with key staff members to discuss the need for developing problem solving attitudes throughout the organization. On a continuing basis, the Plant Manager will meet with all personnel on a department by department basis.

The Operating Department has established the policy whereby any incident which has an effect on safety, unit capability, equipment capability and/or personnel is to be reviewed and reported in writing to the Department Head by the end of the work period. The Department Head is to disseminate this review to other personnel.

2. Technical Specifications

AEPSC engineers are working with the plant staff to review plant-identified problem areas with Technical Specifications, especially those caused by different specifications for the two units. We intend to request changes of the NRC to eliminate these disparities.



June 30, 1978

3. Transfer of Information and
Training of Operators

The "Change Installation Authorization" (CIA) form has been modified to indicate training required prior to installation.

Licensee Event Reports at time of preparation are distributed to each Shift Operating Engineer for dissemination to each shift member. Steps are being taken to provide similar dissemination in other departments as applicable.

A monthly summary sheet of all CIAs and LERS will be prepared and distributed to all departments.

4. Operations Quality Assurance

- (a) We have a full time effort in progress to update Operations QA procedures.
- (b) An additional auditor has been hired.

5. Improved Instructions and Indication
of Equipment Status

General instructions are being developed to guide the director of a unit startup. This includes the development of a flow diagram graphically illustrating inter-relationships of all activities. In addition, a permanent record of the status board is now being maintained.

6. Plant Vacancies

The number of staff vacancies has been substantially reduced. The plant has established a priority list for filling these vacancies.

7. Loss of Offsite Power

We have had three instances of loss of offsite power since 1975, although our second,

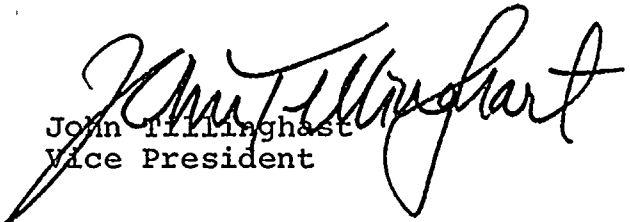
June 30, 1978

independent source (the 69 kV line into the plant which can be manually connected as the emergency source of offsite power) was not affected. To reduce the probability of losing offsite power we recently added a third source of offsite power through a new transformer that steps down from the 345 kV yard to the 345 kV plant reserve system. This third source of offsite power is a backup to the existing 765/345 kV autotransformer.

In addition to these steps, we will be reviewing the training and requalification of plant operating and maintenance staff to perform safety-related duties. We will make sure that we give proper training to each person prior to performing a task, identify clearly to him what work he is to perform with any precautions noted, and if errors are still made, to take other actions to further reduce the possibility of error. In plant operations I am convinced that the person who actually operates and maintains the equipment is the best source of information as to where improvements can be made to reduce error. I have therefore asked the Plant Manager to consider a merit system to stimulate good ideas.

In conclusion, I believe these actions demonstrate that management is intensely concerned and involved in the operation of the plant. We will continue to monitor and audit the plant operations to make sure that the areas of present concern are corrected and that we have a plant operating in a fashion that is both safe and smooth. I hope that we can meet with you and your staff next fall and mutually discuss a record which we can all be proud of.

Very truly yours,


John Tillinghast
Vice President

JT:p

cc: D. V. Shaller
J. E. Dolan
R. W. Jurgensen