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ALEXICH,M.P. Indiana & Michigan Electric Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards minutes of 830913 meeting w/American Electric Power Svc Corp in Bethesda,MD re proposed resolution for numerous environ qualification deficiencies identified by Franklin Research Ctr,per 831024 request.

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INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
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January 17, 1984
AEP:NRC:0775G

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
MINUTES OF SEPTEMBER 13, 1983, NRC/AEPSC MEETING ON
ENVIRONMENTAL QUALIFICATION

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

Dear Mr. Denton:

This letter responds to your letter dated October 24, 1983, to Mr. John E. Dolan of the Indiana & Michigan Electric Company (IMECo). More specifically, your letter granted approval of certain equipment environmental qualification deadline extensions which we requested under the provisions of 10 CFR 50.49. It also noted that the Office of Nuclear Reactor Regulation (NRR) would review the remainder of our environmental qualification program upon receipt of minutes for a meeting held at Bethesda, Maryland, on September 13, 1983, between members of your staff and American Electric Power Service Corporation (AEPSC) personnel. The major topic of that meeting concerned our proposed resolutions for numerous environmental qualification deficiencies identified by an NRR consultant [i.e., Franklin Research Center (FRC)] in late October, 1982 [reference letter dated December 30, 1982, Mr. S. A. Varga (NRC) to Mr. John E. Dolan (IMECo)].

The requested meeting minutes are contained in Attachment 1 to this letter. Additional information is also enclosed in Attachments 2, 3, and 4. In particular, Attachment 2 contains the findings of our review regarding radiation qualification of certain penetration extension wire splices and field cable terminations. Attachment 3 discusses the potential for spurious operation of motor and air operated valves due to short circuits which may result from equipment submergence. Attachment 4 presents a reference which identifies the Westinghouse test reports applicable to the environmental qualification of the Donald C. Cook Nuclear

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Plant hydrogen recombiners. We trust that these documents will provide an adequate basis upon which your staff can complete review of our environmental qualification program, and we look forward to receipt of a final Safety Evaluation Report (SER) on this important topic.

Furthermore, we request that conditions 4.A and 4.B of Amendment No. 6 to Facility Operating License No. DPR-74 [reference letter dated June 16, 1978, R. S. Boyd (NRC) to J. Tillinghast (IMECo)] be deleted from the Donald C. Cook Nuclear Plant Unit No. 2 operating license upon issuance of a final SER. We believe that these license conditions regarding electric equipment environmental qualification should be treated as open items in the SER.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

M. P. Alexich
Vice President

MPA/th

Attachments

cc: John E. Dolan
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Charnoff
E. R. Swanson - NRC Resident Inspector, Bridgman

ATTACHMENT 1 TO AEP:NRC:0775G

MINUTES OF SEPTEMBER 13, 1983, NRC/AEPSC MEETING

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

I. Introduction

By letters dated September 23, 1981 [AEP:NRC:0578, G. P. Maloney (IMECo) to H. R. Denton (NRC)], and June 11, 1982 [AEP:NRC:0578B, R. S. Hunter (IMECo) to H. R. Denton (NRC)], information concerning the environmental qualification of safety related electrical equipment at the Cook Plant was submitted to the NRC for review. Although numerous submittals have been made regarding this topic, these two letters are of particular importance because their attachments contained, among other items of information, series of System Component Evaluation Worksheets (SCEWs) for those equipment items which we believed to be within the scope of the environmental qualification program to be reviewed as per the guidance contained in IE Bulletin 79-01B (which included the DOR Guidelines and NUREG-0588 as Enclosures 4 and 5, respectively).

The acceptability of our environmental qualification program, as outlined in part by the two submittals referenced above, was reviewed for the NRC Division of Engineering by the Franklin Research Center (FRC) as part of the Nuclear Reactor Regulation (NRR) Technical Assistance Program in support of NRC operating reactor licensing actions. The FRC review findings for the Cook Plant are documented in a four-volume report entitled, "Technical Evaluation Report: Review of Licensees' Resolution of Outstanding Issues From NRC Equipment Environmental Qualification Safety Evaluation Reports" (TER), dated October 28, 1982. As noted in our letter dated January 24, 1983 [AEP:NRC:0775, R. S. Hunter (IMECo) to H. R. Denton (NRC)], we received the final volumes of the TER on January 17, 1983 and soon thereafter notified the NRC that we believed a working group meeting would be beneficial to our understanding of the FRC TER findings.

On September 13, 1983, the requested working group meeting took place at the NRC offices in Bethesda, Maryland, with Messrs. J. Calvo, S. Kim, R. LaGrange, P. Shemanski, and D. Wigginton of the NRC, and Messrs. M. Alexich, L. Caso, J. Feinstein, H. Fouad, T. King, D. Medek, and R. Shoberg of the American Electric Power Service Corporation (AEPSC) in attendance. This attachment is intended to document our understanding of the discussions at that meeting (and in follow-up telephone conversations) in order to provide a basis for NRC review of the remainder of the Cook Plant environmental qualification program for electrical equipment important to safety.

The following sections of this attachment discuss our plans and schedule for resolving outstanding concerns identified in the FRC TER. There are, however, certain points which must be noted:

- The FRC TER deficiencies of concern were identified for equipment items classified as being in NRC Categories I.B. (Equipment Qualification Pending Modification) and II.A. (Equipment Qualification Not Established). No equipment items were identified in NRC Category II.B. (Equipment Not Qualified). Equipment items in NRC Category IV. (Documentation

Not Made Available) were addressed in our letter dated August 10, 1983 [AEP:NRC:0775D, M. P. Alexich (IMECo) to H. R. Denton (NRC)]. Tables I and II identify the specific deficiencies of concern.

- Deficiencies in documentation and similarity were discussed generically at the meeting and are therefore treated generically herein (specific problems in documentation and similarity which relate to other deficiencies are, however, treated specifically).

- Deficiencies regarding aging qualification of equipment were discussed generically at the meeting and are therefore treated generically herein.

- No deficiencies were identified in test sequence, duration margin, or margins for those equipment items in NRC Categories I.B. and II.A.

- All other deficiencies (e.g., chemical spray, submergence, etc.) are treated specifically.

- The number of deficiencies identified has not been adjusted to account for certain equipment items which have been deleted from the scope of our environmental qualification program (e.g., Mercoid pressure switches, etc.). Tables I and II, furthermore, do not identify all equipment items within the scope of the environmental qualification final rule, 10 CFR 50.49. Rather, the two Tables summarize deficiencies identified by the FRC TER.

- Our position regarding replacement equipment upgrading is presented in Section V. of this Attachment.

II. Deficiency Categories 1 and 2: Documentation and Similarity

In order to prove environmental qualification of electric equipment important to safety, certain documentation requirements must be met by power reactor licensees. For the Cook Plant, NRC guidance with regard to these documentation requirements is contained in Section 8.0 of the DOR Guidelines, in NUREG-0588, in Plant Technical Specification 6.13.2, and in 10 CFR 50.49. These documents basically require that complete and auditable records exist to prove environmental qualification, and that such records should describe the qualification method in sufficient detail to allow an independent reviewer to conclude that all applicable qualification criteria have been adequately addressed. With regard to similarity between tested and installed electrical equipment, Section 5.2.2 of the DOR Guidelines indicates that the preferred method of proving similarity is to install equipment identical in design and material construction to a type test specimen. Any deviations from this method are to be evaluated as part of the associated qualification documentation.

For the Cook Plant, thirty-seven documentation and forty-five similarity deficiencies were identified for equipment items in NRC Categories I.B. and II.A. (see Tables I and II). Although the bulk of

these deficiencies were discussed on a generic basis, certain deficiencies and other documentation concerns were discussed specifically. The specific items discussed are as follows:

a) Mobilux EP2 lubricant (FRC TER Item No. 24, Unit Nos. 1 and 2). We were informed by the NRC staff that the data sheets provided by the vendor as proof of qualification would not be accepted without supporting documentation showing where the data sheet values came from. The NRC staff agreed that since supporting proprietary information could be difficult to obtain, documentation indicating that we have audited the vendor's records for acceptability would constitute proof of qualification.

b) Sostman Model Nos. 11834B and 11901B and Rosemount Model Nos. 176KF and 176KS Resistance Temperature Detectors (RTDs) (FRC TER Item Nos. 18, 19, 21, and 23, Units Nos. 1 and 2; FRC TER Item Nos. 111 and 122, Unit No. 2). The FRC TER review for these RTDs indicate that the referenced test report (i.e., WCAP-9157, dated September 1977) did not fully address chemical spray qualification parameters such as spray density and duration. We agreed at the September 13, 1983, meeting to contact Westinghouse in order to verify and document that such testing was, indeed, performed adequately.

c) Electrical termination located within containment (FRC TER Item No. 81, Unit Nos. 1 and 2). The FRC TER review for this connection indicates that the qualification radiation dose does not envelope the specified radiation service condition. Although the corresponding System Component Evaluation Worksheets (SCEWs) in Attachments 4 and 5 to our Letter No. AEP:NRC:0578B, dated June 11, 1982, indicate that there is no problem with radiation qualification for this termination, we informed the NRC staff at the meeting that we would check our files once again to ensure that proof of qualification actually exists. This review has since been completed, and the results are summarized in Attachment 2 to this submittal. The termination has been found to be qualified for its radiation service conditions.

d) The NRC staff asked us about the qualification status of Foxboro NE transmitters and Target Rock solenoid-actuated globe valves. We informed the staff that completed test reports had not yet been received and/or reviewed for these equipment items, but that all available information to date (e.g., conversations with vendors/suppliers, preliminary test results, etc.) did not indicate that problems were likely to be encountered. We are still pursuing this topic at the present time, and expect to resolve these documentation problems on or before June 3, 1984.

e) We informed the NRC staff that the documentation trail for some cables was questionable as proof of tested item versus installed item similarity. We are essentially complete with this work now. Work remains to organize the documentation files to assure complete traceability.

On a generic basis, we informed the NRC staff that, for many of the equipment items of concern, we believe that we already have adequate documentation in our files to prove environmental qualification. For cases such as lubricants, RTDs, etc., the Director of the Office of Nuclear Reactor Regulation has approved an extension of documentation completion deadline to June 3, 1984 [see letter dated October 24, 1983, H. R. Denton (NRC) to John E. Dolan (IMECo)]. In cases where proof of similarity is a concern, we will address those equipment items which have the greatest safety significance first, with eventual resolution of all concerns to be emphasized commensurate to each equipment item's relative importance to safety. Tracing of documentation trails will be completed via the use of Purchase Orders and vendor/supplier correspondence, as applicable. The guidance provided by IEEE Standard 383-1974 Section 2.2 and Table I is also being used. We expect to make documentation trails available at the Cook Plant site by June 30, 1984.

We also note that we are in the process of conducting an internal audit of our environmental qualification files. If qualification summary (SCEW) sheets are updated as a result of this work, then they will be retained in our files and not transmitted to NRR for additional review.

III. Deficiency Categories 3, 4, 5, and 6: Aging Evaluation, Qualified Life, Aging Program, and Aging Simulation

Basic requirements relating to aging qualification of electrical equipment are outlined in Section 7.0 of the DOR Guidelines and in NUREG-0588. The FRC TER review of the Cook Plant environmental qualification program identified a total of one hundred fifty-seven deficiencies in the categories of aging evaluation, qualified life, aging simulation, and establishment of a surveillance/maintenance/replacement (SMR) program.

As we explained to NRC staff at the September 13, 1983, meeting, we believe that we are taking adequate actions to ensure resolution of all aging qualification concerns. In particular, as reported in our letter of March 4, 1983 [AEP:NRC:0775B, R. S. Hunter (IMECo) to H. R. Denton (NRC)], we have contracted a consultant to perform aging analyses and provide input to an SMR program for the Cook Plant. Furthermore, as stated in our letter dated August 10, 1983 [AEP:NRC:0775D, M. P. Alexich (IMECo) to H. R. Denton (NRC)], if installed equipment is found to be non-qualified as the analyses are completed, then our plan is to establish an expedited program to replace that equipment and/or provide alternate measures to ensure accomplishment of the affected safety function (i.e., provide justification for continued operation). As a result of these commitments, we have already received approval for an extension of aging qualification deadlines to March 31, 1985, from the Director of the Office of Nuclear Reactor Regulation [see letter dated October 24, 1983, H. R. Denton (NRC) to John E. Dolan (IMECo)].

Additional aging topics discussed at the meeting are as follows:

a) NRC staff suggested that our forthcoming SMR program also include equipment items with a forty-year qualified life. Such items could be checked for degradation every five or ten years. We will consider this suggestion in the development of the SMR program, but we note,

however, that we are not committing to perform destructive testing on cables or other long-life items at the present time.

b) Aging simulation deficiencies are not strictly applicable to Cook Plant, because the equipment reviewed by FRC was to have been reviewed for compliance with the DOR Guidelines, not NUREG-0588. The Cook Plant aging evaluation and SMR program will, when completed, meet the intent of the DOR Guidelines.

IV. Resolution of Other Deficiencies

In addition to the aging-related, documentation, and similarity deficiencies discussed generically, we discussed in detail a total of fifty-nine deficiencies identified in the FRC TER regarding requirements for peak temperature, peak pressure, duration, profile enveloping, steam exposure, chemical spray, submergence, radiation, test failures, functional testing, and instrument accuracies for those equipment items in NRC Categories I.B. and II.A. The equipment items of concern and the relative breakdown of these deficiencies are presented in Tables I and II. Proposed resolutions for these deficiencies, as discussed with NRC staff, are presented below:

a) Limitorque Motor Valve Actuator (MVA) Model No. SMB000 (FRC TER Item No. 1, Unit Nos. 1 and 2). Identified deficiency: chemical spray. This item is the MVAs for the air recirculation backdraft dampers. Due to their location within containment, these MVAs are not subject to direct spray impingement. Furthermore, these MVAs have a required operating time of thirty minutes. The FRC TER indicated that the effects of chemical deposition resulting from exposure to a caustic environment must be addressed. The NRC staff agreed with our contention, however, that this concern over chemical attack should be considered inapplicable to a motor operator of such relatively short operating time enclosed in a weather-proof housing.

b) Limitorque MVA Model No. SMB00 (FRC TER Item No. 2, Unit Nos. 1 and 2). Identified deficiencies: submergence and radiation. With regard to submergence qualification, this MVA must close within 15 seconds of receipt of a Phase A containment isolation signal, and therefore performs its function prior to being submerged. Once submerged, spurious operation of the motor operated valve is prevented due to double breaking of the associated control circuit (see Attachment 3 for a discussion on AEPSC design philosophy). With regard to radiation qualification of the MVA, it was noted that the Westinghouse supplied valve had Class H insulation and was specified for nuclear service inside containment. Furthermore, we noted that due to the short operating time and the use of white melamine (a radiation resistant material) for the limit switch, we believed there was no radiation qualification concerns. The NRC staff agreed with our contentions.

c) Limitorque MVA Model Nos. SMB1, SMB00, and SMB2 (FRC TER Item No. 3, Unit Nos. 1 and 2). Identified deficiency: submergence. The ECCS injection and RHR normal cooling valves have a required operating time of 30 minutes. As we informed NRC staff, the type test specimens were accidentally submerged during testing. No failure was

experienced, but the duration of the submergence could not be determined. Nevertheless, as explained in Attachment 3, we believe spurious operation following submergence is prevented due to AEPSC's design philosophy of double breaking the control circuits. The NRC agreed with this argument, but questioned whether: (a) Cook Plant valves IMO-128 and ICM-111 and -129 would be submerged by a feedwater line break inside containment, and, (b) if so, could they properly function after being submerged. We committed at the meeting to study this issue, and presently expect to resolve the NRC staff concerns by June 3, 1984.

d) Limitorque MVA Model No. SMB00 (FRC TER Item No. 5, Unit Nos. 1 and 2). Identified deficiency: chemical spray. FRC questioned spray qualification for the Pressurizer PORV Block Valves' MVAs because we did not explicitly address chemical deposition resulting from exposure to a caustic atmosphere. As with the air recirculation backdraft damper MVA discussed in IV.a. above, we informed NRC staff that these MVAs were installed in a weather-proof housing away from direct spray impingement (i.e., in the Pressurizer doghouse), and that they had a relatively short operating time (i.e., 14 days) when compared with the time needed to cause significant chemical attack. NRC staff agreed that these MVAs are considered qualified.

e) Limitorque MVA Model No. SMB2 (FRC TER Item No. 6, Unit Nos. 1 and 2). Identified deficiency: radiation. As with the MVA discussed in IV.b. above, the MVAs for the RHR suction valves from the containment sump were supplied by Westinghouse with Class H insulation specified for nuclear service inside containment. These MVAs are, however, installed outside the reactor containment, but near a major recirculation line. These MVAs also utilize white melamine for the limit switch material. Although these valves have a required operating time of 1 day, the NRC staff agreed with us that these MVAs are considered qualified.

f) Reliance Electric Containment Spray Pump Motor Frame #5810P (FRC TER Item No. 14, Unit Nos. 1 and 2). Identified deficiency: radiation. The FRC review for this pump motor indicates that it has no documented radiation withstandability. Our plans to resolve this issue were discussed in Attachment 5 to our letter of May 20, 1983 [AEP:NRC:0775C, R. F. Hering (IMECo) to H. R. Denton (NRC)], and reiterated at the September 13, 1983, meeting. We have since received a radiation qualification verification test report from Reliance dated August 1983. This report is currently under review, with initial findings indicating that the pump motor is fully qualified.

g) Westinghouse Hydrogen Recombiner (FRC TER Item No. 15, Unit Nos. 1 and 2). Identified deficiencies: peak temperature, duration, profile enveloped, steam exposure. The identification of these deficiencies in the FRC review appear to be based on the use of WCAP-7709-L, Supplement 7, in determining qualification parameters for the recombiner units. Our qualification program, however, utilizes WCAP-7709-L, Supplement 2, as a source document. As discussed in Attachment 4 to this submittal, WCAP-7709-L, Supplement

2, and not S[redacted]lement 7, is applicable to the [redacted]ok Plant. We therefore believe that our hydrogen recombiners are qualified.

h) Sostman Model Nos. 11834B and 11901B and Rosemount Model Nos. 176KF and 176KS RTDs (FRC TER Item Nos. 18, 19, 20, 21, 22, and 23, Unit Nos. 1 and 2; FRC TER Item Nos. 111 and 122, Unit No. 2). Identified deficiencies (varies for different FRC TER Item Nos. - see Table I for specific breakdown): chemical spray, submergence, functional testing, and instrument accuracy. The submergence deficiency identified for FRC TER Item No. 22 appears to be a case of a misplaced checkmark. This deficiency should most likely have been identified as a chemical spray deficiency. With regard to the identified spray deficiencies, it is noted that all of the RTDs were qualified under test report WCAP-9157, dated September 1977. This report, however, does not give spray qualification parameters. Our resolution of this issue (see II.b. above) is expected to be completed well in advance of the March 31, 1985, deadline approved by the Director of the Office of Nuclear Reactor Regulation [see letter dated October 24, 1983, H. R. Denton (NRC) to John E. Dolan (IMECo)]. For the narrow range instruments, FRC identified concerns over functional testing and instrument accuracy are considered inapplicable since the RTDs perform their function (i.e., reactor trip) prior to "seeing" a hostile environment. Similar concerns for the wide range instruments (used in post-accident monitoring) were identified by FRC, apparently due to the selection of calibration points for the RTDs used during the test sequence. We committed at the September 13, 1983, meeting to document in our files that these concerns are inapplicable as long as identical calibration methodologies are used between tested and installed equipment. The NRC staff agreed with this approach.

i) Mobilux EP2 Lubricant (FRC TER Item No. 24, Unit Nos. 1 and 2). Identified deficiencies: peak temperature, peak pressure, duration, profile enveloped, and radiation. All of these deficiencies were apparently identified by FRC because the reviewers would not accept vendor data sheets as a "stand alone" proof of qualification. These deficiencies are expected to be resolved by June 3, 1984, along with resolution of the documentation deficiency (see II.a. above).

j) Barton Model No. 763 pressure and Model No. 764 differential pressure (D/P) transmitters (FRC TER Item Nos. 36, 37, 38, 39, 40, and 56, Unit Nos. 1 and 2; FRC TER Item Nos. 104, 107, 112, 115, and 116, Unit No. 2). Identified deficiencies: submergence, test failure, and instrument accuracy. (Deficiencies vary between FRC TER Item Nos. - see Table I for specific breakdown.) These transmitters were originally qualified under Westinghouse test report NS-TMA-1950, dated September 1978. The FRC identified deficiencies in test failure and instrument accuracy appear to arise from test conditions in which both narrow range and wide range pressure transmitters and D/P transmitters exceeded span specifications. These supposed problems were addressed successfully by Westinghouse test reports NS-TMA-2120 and NS-TMA-2441. These latter reports were not, however, factored into the FRC review. With regard to submergence qualification on FRC TER Item Nos. 38, 40, and 56, concern arose over our application of a steam test at 75 psig (with no steam leakage

into the transmitter casing) as proof of submergence qualification at an effective hydrostatic head of 5 psig. The NRC staff did not accept this engineering judgment. It was therefore agreed that we would attempt to test the transmitters by March 31, 1985, or, if such testing proves to be impractical, we would replace or relocate the transmitters by the same date.

k) NAMCO Model No. EA180 limit switch (FRC TER Item No. 48, Unit Nos. 1 and 2). Identified deficiency: steam exposure. The identified deficiency appears to be based on the FRC observation that we did not identify the method of control cable termination at the limit switch in the qualification of the limit switch. The qualification test report indicated that the tested connections were protected from steam environment by sealing the chamber/threaded pipe interface with Teflon tape. We informed the NRC staff that the limit switch connections in place at the Cook Plant are, indeed, protected from steam environment due to the method of installation. This information had been included in the previously submitted qualification (SCEW) sheets for the control cable termination at the limit switch.

l) Continental wire (FRC TER Item Nos. 52 and 54, Unit Nos. 1 and 2). Identified deficiency: test failure. Due to difficulties encountered with the associated leads used to connect Continental wire samples through the chamber wall during testing, these samples had to be removed from the circuitry during testing. Since the test setup was deficient, rather than the test samples involved, the NRC staff agreed with us that this deficiency could be disregarded.

m) Electrical termination inside containment (FRC TER Item No. 81, Unit Nos. 1 and 2). Identified deficiency: radiation. See II.c. above and Attachment 2 for a description of this deficiency and our proposed resolution.

n) Boston Insulated wire (FRC TER Item No. 98, Unit Nos. 1 and 2; FRC TER Item No. 106, Unit No. 2). Identified deficiency: Profile enveloped. As noted by the FRC review, the LOCA test profile for these samples did not envelope the FSAR temperature profile after the initial peak. Although we informed NRC staff that the FSAR profile after the peak was below the normal operating rating of the cable, we were told that this approach was unacceptable since initial LOCA transient effects on cable rating could not be quantified. At the suggestion of NRC staff, we have taken available margin from the short test and used Arrhenius analysis techniques to qualify the cable for long term response. According to our calculations, the margin of test profile over accident profile amounts to thirty-four years.

Furthermore, although not specifically identified by FRC, certain issues relating to submergence qualification of Boston Insulated Wire Item #3075, Samuel Moore Cable Item #3075, and instrument cable splices (Raychem) have been raised. These issues are discussed in paragraph (f) of letter No. AEP:NRC:0775F [M. P. Alexich (IMECo) to H. R. Denton (NRC), dated September 26, 1983]. Final resolution of submergence qualification for these items is

expected to be complete on or before March 31, 1985 [reference letter dated October 24, 1983, H. R. Denton (NRC) to John E. Dolan (IMECo)].

V. Replacement Equipment Upgrading

In accordance with paragraph (1) of 10 CFR 50.49, replacement equipment will be upgraded unless sound reasons to the contrary exist. For the Donald C. Cook Nuclear Plant, conditions which reflect sound reasons why replacement equipment need not be upgraded include the following:

- Identical equipment is to be used as a replacement, and procurement activities regarding such replacement equipment had commenced prior to February 22, 1983.

- Replacement equipment qualified in accordance with the provisions of IEEE 323-1974 does not exist.

- Replacement equipment qualified in accordance with the provisions of IEEE 323-1974 is not available to meet installation and operation schedules. Equipment qualified to the DOR Guidelines or IEEE 323-1971 may be used for an interim period until upgraded equipment is obtained and an outage of sufficient duration is available for replacement. Justification for use of replacement equipment not upgraded after this interim period has expired will be submitted to the NRC for review.

- Replacement equipment qualified to IEEE 323-1974 would require significant plant modifications to accommodate its use.

- Operating performance and reliability data for replacement equipment qualified to IEEE 323-1974 indicates poor overall equipment performance (e.g., mean time to failure is significantly shorter for the replacement equipment).

- The use of replacement equipment qualified to IEEE 323-1974 has a significant probability of creating human factor problems that may negatively affect plant safety and performance, for example: (a) knowledge, skills, and ability of existing plant staff will require significant upgrading to operate or maintain the specific replacement equipment; (b) the use of the replacement equipment creates a one-of-a-kind application; or (c) maintenance, surveillance, and/or calibration activities are unnecessarily complex for the replacement equipment.

Furthermore, equipment components that are routinely replaced as part of normal equipment maintenance (e.g., gaskets, O-rings, coils, etc.), and components which are part of an equipment item qualified as an assembly (e.g., a resistor which is part of a transmitter), may be replaced with components of identical design. For those cases where an equipment item is replaced with upgraded equipment, the baseline environmental parameters to which the replacement equipment is qualified may be identical to the qualification parameters for the original equipment.

Table I

EQUIPMENT QUALIFICATION DEFICIENCIES IDENTIFIED IN THE FRANKLIN RESEARCH CENTER TECHNICAL EVALUATION REPORTS DATED OCTOBER 28, 1982

Donald C. Cook Unit No(s).	FRC TER Item No.	Equipment Item Description	Deficiencies 1	2	3	4	5	6	7A	7B	7C	7D	7E	8	9	10	11	12	13	14	15	16
1,2	1	Limitorque MVA SMB000		x	x	x								x								
1,2	2	Limitorque MVA SMB00		x	x	x									x	x						
1,2	3	Limitorque MVA SMB/1,00,2		x	x	x									x							
1,2	4	Limitorque MVA SMB1		x	x	x																
1,2	5	Limitorque MVA SMB00		x	x	x								x								
1,2	6	Limitorque MVA SMB2		x	x	x										x						
1,2	7	Limitorque MVA		x	x	x																
1,2	8	Limitorque MVA		x	x	x																
1,2	9	Limitorque MVA		x	x	x																
1,2	10	W 5009P24	x	x	x	x	x															
1,2	11	W 5009H	x	x	x	x	x															
1,2	12	W 5808Z	x	x	x	x	x															
1,2	13	W TBDP		x	x	x	x															
1,2	14	Reliance Frame #5810P	x		x	x	x									x						
1,2	15	W			x	x		x	x		x	x	x									
1,2	16	Conax EP2 through EP14		x	x	x																
1,2	17	Conax EP1		x	x	x																
1,2	18	Sostman 11901B	x		x	x								x					x	x		
1,2	19	Rosemount 176KS	x		x	x								x					x	x		
1,2	20	Sostman 11834B	x		x	x													x	x		
1,2	21	Rosemount 176KF	x		x	x								x					x	x		
1,2	22	Sostman 11834B	x		x	x									x				x	x		
1,2	23	Rosemount 176KF	x		x	x								x					x	x		
1,2	24	Mobilux EP2	x		x	x	x	x	x	x	x	x				x						
1,2	36	Barton 763			x	x														x		
1,2	37	Barton 763			x	x														x		
1,2	38	Barton 764			x	x									x					x		
1,2	39	Barton 764			x	x														x		
1,2	40	Barton 764			x	x									x					x		
2	43	Foxboro E13DHHSAH1 MCA	x																			
1,2	44	Foxboro E13DMHSAH1		x	x	x																
1,2	48	Namco EA180			x	x							x									

Table I (continued)

Donald C. Cook Unit No(s).	FRC TER Item No.	Equipment Item Description	Deficiencies 1	2	3	4	5	6	7A	7B	7C	7D	7E	8	9	10	11	12	13	14	15	16
1,2	51	Fisher 546	x																			
1,2	52	Continental Wire			x	x		x										x				
1,2	54	Continental Wire			x	x		x										x				
2	55	Cyprus Power Cable		x																		
1,2	56	Barton 763			x	x									x					x		
1,2	57	Asco HP/HT 8300 Series	x																			
1,2	60	Asco HT8316	x																			
1,2	61	W 1101	x																			
1,2	62	Mercoid DA7031153	x																			
1,2	63	Electrical Termination	x																			
1,2	64	Electrical Termination	x																			
1,2	65	Electrical Termination	x	x	x	x		x														
1,2	66	Electrical Termination	x																			
1,2	67	Electrical Termination	x																			
2	68	Electrical Termination		x	x	x		x														
1,2	69	Electrical Termination	x																			
1,2	70	Electrical Termination		x	x	x		x														
1,2	71	Electrical Termination	x																			
1,2	72	Electrical Termination	x																			
1,2	73	Electrical Termination	x																			
1,2	74	Electrical Termination	x																			
1,2	75	Electrical Termination	x																			
1,2	76	Electrical Termination	x																			
1,2	78	Penetration Termination	x																			
1,2	79	Electrical Termination		x																		
1,2	81	Electrical Termination		x	x	x		x								x						
1,2	82	Electrical Termination		x	x	x		x														
1,2	83	Electrical Termination		x	x	x		x														
1,2	84	Electrical Termination	x																			
1,2	85	Anaconda Power Cable		x	x	x																
2	86	Anaconda Power Cable		x	x	x																
1,2	89	Okonite Power Cable		x	x	x																
1,2	90	Okonite Power Cable		x	x	x																
1,2	95	Cyprus Power Cable		x	x	x																
1,2	96	Continental Wire		x	x	x																

Table I (continued)

Donald C. Cook Unit No(s).	FRC TER Item No.	Equipment Item Description	Deficiencies 1	2	3	4	5	6	7A	7B	7C	7D	7E	8	9	10	11	12	13	14	15	16
1,2	97	Samuel Moore Cable		x	x	x																
1,2	98	Boston Insulated Wire			x	x		x				x										
1,2	99	Boston Insulated Wire		x	x	x																
1,2	100	Cerro Cable		x	x	x																
2	101	Rockbestos Cable		x	x	x																
2	102	Anaconda Power Cable		x	x	x																
2	104	Barton 763			x	x												x				
2	105	Continental Wire		x	x	x																
2	106	Boston Insulated Wire			x	x		x				x										
2	107	Barton 764			x	x												x				
2	108	Barton 368	x																			
2	110	W 1101	x																			
2	111	Rosemount 176KF	x		x	x								x					x	x		
2	112	Barton 764			x	x												x				
2	115	Barton 763			x	x												x				
2	116	Barton 763			x	x												x				
2	117	Anaconda Control Cable		x	x	x																
2	118	Continental Wire		x	x	x																
2	119	Raychem Cable		x	x	x																
2	120	Raychem Cable		x	x	x																
2	121	Cable Termination	x																			
2	122	Sostman 11834B	x		x	x								x					x	x		
1	43	Foxboro E13DMHIMID	x																			
1	55	Okonite Power Cable		x																		
1	68	Electrical Termination		x	x	x		x														
1	86	Anaconda Power Cable		x	x	x																
1	101	Rockbestos Cable		x	x	x																
1	102	Anaconda Power Cable		x	x	x																

TABLE II

SUMMARY OF DEFICIENCIES IDENTIFIED IN THE FRANKLIN RESEARCH CENTER TECHNICAL EVALUATION REPORTS DATED OCTOBER 28, 1982 FOR EQUIPMENT ITEMS IN CATEGORIES I.B. AND II.A.

DEFICIENCY CATEGORY	REQUIREMENT	NUMBER OF DEFICIENCIES UNIT 1	UNIT 2	BOTH UNITS*
1	Documentation	31	36	37
2	Similarity	35	40	45
3	Aging Evaluation	52	65	69
4	Qualified Life	52	65	69
5	Aging Program	6	6	6
6	Aging Simulation	11	12	13
7A	Peak Temperature	2	2	2
7B	Peak Pressure	1	1	1
7C	Duration	2	2	2
7D	Profile Enveloped	3	4	4
7E	Steam Exposure	2	2	2
8	Spray	6	8	8
9	Submergence	6	6	6
10	Radiation	5	5	5
11	Test Sequence	0	0	0
12	Test Failure	2	7	7
13	Functional Testing	6	8	8
14	Instrument Accuracy	12	14	14
15	Duration Margin	0	0	0
16	Margins	0	0	0
Total Number of Deficiencies:		234	283	298

*NOTE: Number of deficiencies identified for "Both Units" is adjusted to account for equipment items and Franklin Research Center reviews which are identical between the Donald C. Cook Nuclear Plant Unit Nos. 1 and 2.

ATTACHMENT 2 TO AEP:NRC:0775G

REVIEW OF FRC TER ITEM NO. 81 RADIATION QUALIFICATION

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

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AMERICAN ELECTRIC AEP POWER SYSTEM

DATE: December 6, 1983

SUBJECT: Franklin Technical Evaluation Report
Item 81 (SCEW #TP-2, TP-3)

FROM: L. F. Caso

TO: D. Medek

SCEW sheets TP-2 and TP-3 in our AEP-NRC-0578B submittal describe respectively the penetration extension wire splice to the field cable inside a floodup box and the field cable termination at the hydrogen recombiners and motor terminals. Both these terminations were qualified to 150 mrads under Westinghouse - Canada test report CWAPD-332, test samples D3 and D4 (TP-2) and E3, E4, F3, F4 (TP-3).

Both Test Items D3 and D4 did not remain energized throughout the entire test period. Test Item D3 failed to remain energized after approximately 2 hours and Test Item D4 after approximately 48 hours of exposure to the test conditions. Post-test examination of both test items revealed that the Kapton insulation on the lead wires was severely damaged at various locations.

The spliced connections of Test Item D3 successfully passed the post-test hi-pot tests in water. However, the Kapton insulation of Test Item D4 was damaged at a location very close to the splices and the post-test hi-pot test could not be performed on Test Item D4.

No portions of these test items were protected from the chemical spray by floodup tubes and there was no apparent damage to either the hypalon-jacketed cables or the associated field splices.

It should be noted that the exposed Kapton and its field splice as tested, is not representative of the present installations at the D. C. Cook plant for the long term instrumentation circuits installed in floodup tubes and all safety related power and control circuits. For these circuits the Kapton wire is routed inside a stainless steel floodup tube from the penetration to the floodup box. The whole assembly is constructed to avoid direct spray impingement on the splice or Kapton wire, and also to prevent water filling up the floodup tube (the floodup box is installed at a location above the expected flood level).

Splice connection TP-2 is a Raychem Corporation splice that has also been qualified by Raychem Corporation under test report F-C4033-3 (EQ central file Ref #14). The total radiation dose used during this test was of 200 mrads (see attached test profile).

There were no eventualities in connection with the TP3 test samples.

SCEW sheets TP-2 for both DC Cook units will be revised to reference both the Westinghouse - Canada and the Raychem test reports.

Please let me know if you have any questions.

L. F. Caso

LFC/ris/2
APPROVED R. C. Carruth

R. C. Carruth

cc: H. N. Scherer, Jr.
S. H. Horowitz
R. C. Carruth
T. E. King
J. A. Pria
R. Shoberg
J. G. Feinstein
R. F. Kroeger

3.4 INSTRUMENTATION

Chamber temperature and pressure were monitored continuously on strip-chart recorders. The locations of the thermocouple junctions were as shown in Figure 5.

A list of the data acquisition instruments used in the test program is included as Appendix A.

Radiation Dosimetry data are included as Appendix B.

3.5 COMBINED RADIATION AND THERMAL AGING EXPOSURE

The specimens were electrically energized as stated in Section 3.3, while simultaneously thermally aged at 150°C (302°F) and irradiated to an air-equivalent dose of 5×10^7 rads. The vessel was electrically heated. During this exposure air was circulated through the test vessel by an external blower. Insulation resistance measurements were made during and after this exposure.

Note: *An air-equivalent dose means that the volume occupied by the specimens receives an isotropic flux of gamma radiation equivalent to the radiation dose that would result if the volume contained only air.*

3.6 LOSS-OF-COOLANT ACCIDENT (LOCA) ENVIRONMENT EXPOSURE

Following the combined radiation-thermal aging exposure, the specimens were simultaneously exposed to steam, chemical-spray and gamma radiation (S/C/R) as illustrated in Figure 8.

A chemical spray consisting of 3000 ppm boron as boric acid, 0.064 molar sodium thiosulfate and adjusted with sodium hydroxide to a pH of 10.5 at room temperature, was applied at the rate of 0.15 gpm per square foot (100 ml per second per square meter) of spray area (See Section 3.2). Fresh heated spray solution was used for the first hour of the profile. Thereafter, the spray solution was recirculated from the reservoir at the bottom of the chamber. The pH was monitored periodically, and was maintained within the range of 9.5 to 11.0 by addition of fresh solution.

During the S/C/R exposure, the specimens were energized as indicated in Section 3.3.

3.7 MANDREL WRAP AND HIGH-POTENTIAL WITHSTAND TESTS

After the S/C/R exposure, before the test vessel was removed from the radiation hot cell, it was filled with tap water and insulation resistance measurements and preliminary

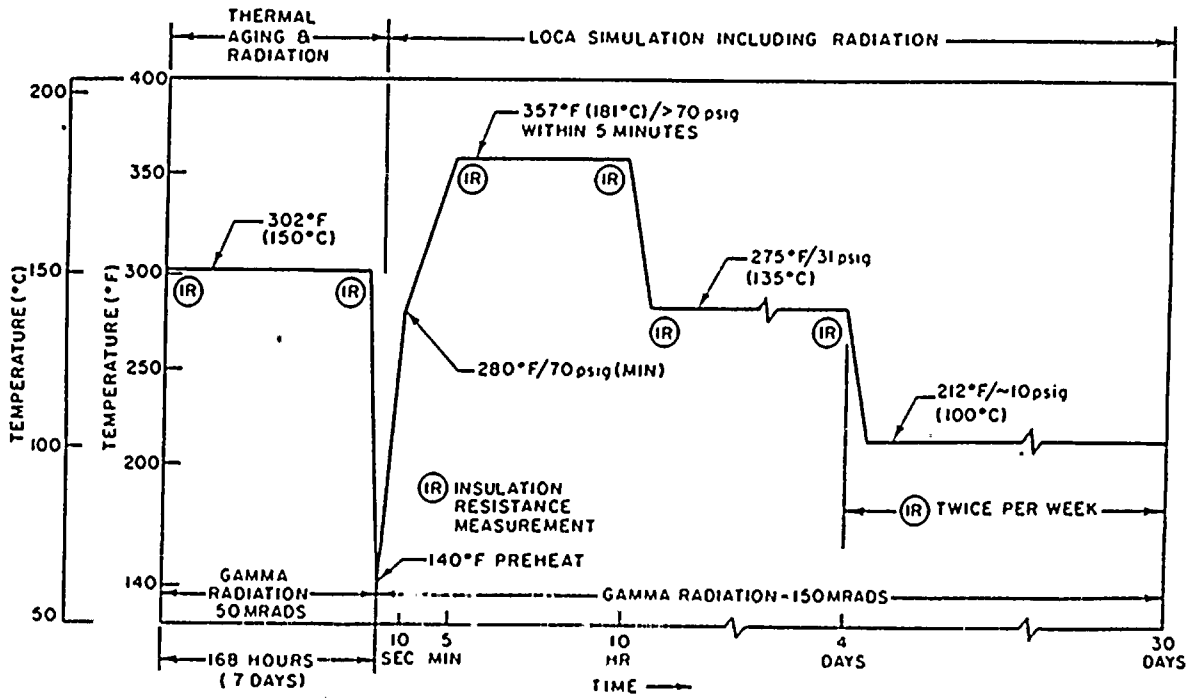


Figure 8. Temperature/pressure profile for simulation of Loss-Of-Coolant Accident environment.

ATTACHMENT 3 TO AEP:NRC:0775G

SPURIOUS OPERATION OF MOTOR OPERATED VALVES

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

POWER SYSTEM

V5

DATE: April 5, 1983

SUBJECT: Spurious Operation of Motor and Air Operated Valves

FROM: B. Lee

TO: T. E. King

The following is a description of AEP's "Double Break" philosophy and its impact on the question of spurious operation of motor and air operated valves.

The possibility of spurious operation of motor operated and air operated valves due to short circuits is minimized by AEP's philosophy of double breaking of the control circuit. The double break concept, as illustrated in enclosed schematic, requires control contacts be located in both polarities of the actuating circuit. With this configuration, a short circuit between points A to B or between points C to D cannot cause a spurious operaton of the valve. A short circuit between points A to D will cause protective devices upstream to isolate the short. This will result in motor operated valves remaining in the position just prior to the short circuit and air operated valves traveling to their de-energized position.

A spurious operation can only occur with a simultaneous short circuit from points A to B and C to D and a high impedance path maintained from points B to C.

It should be noted that points A, B, C and D are all located in very close proximity of each other. The selective short circuits without a circuit fault is extremely unlikely when the double break criterion is applied.

To further illustrate the double break philosophy, refer to attached cable schematic 84851-12 indicating the control circuit cable run for pressuirzer power relief valve NRV-151.

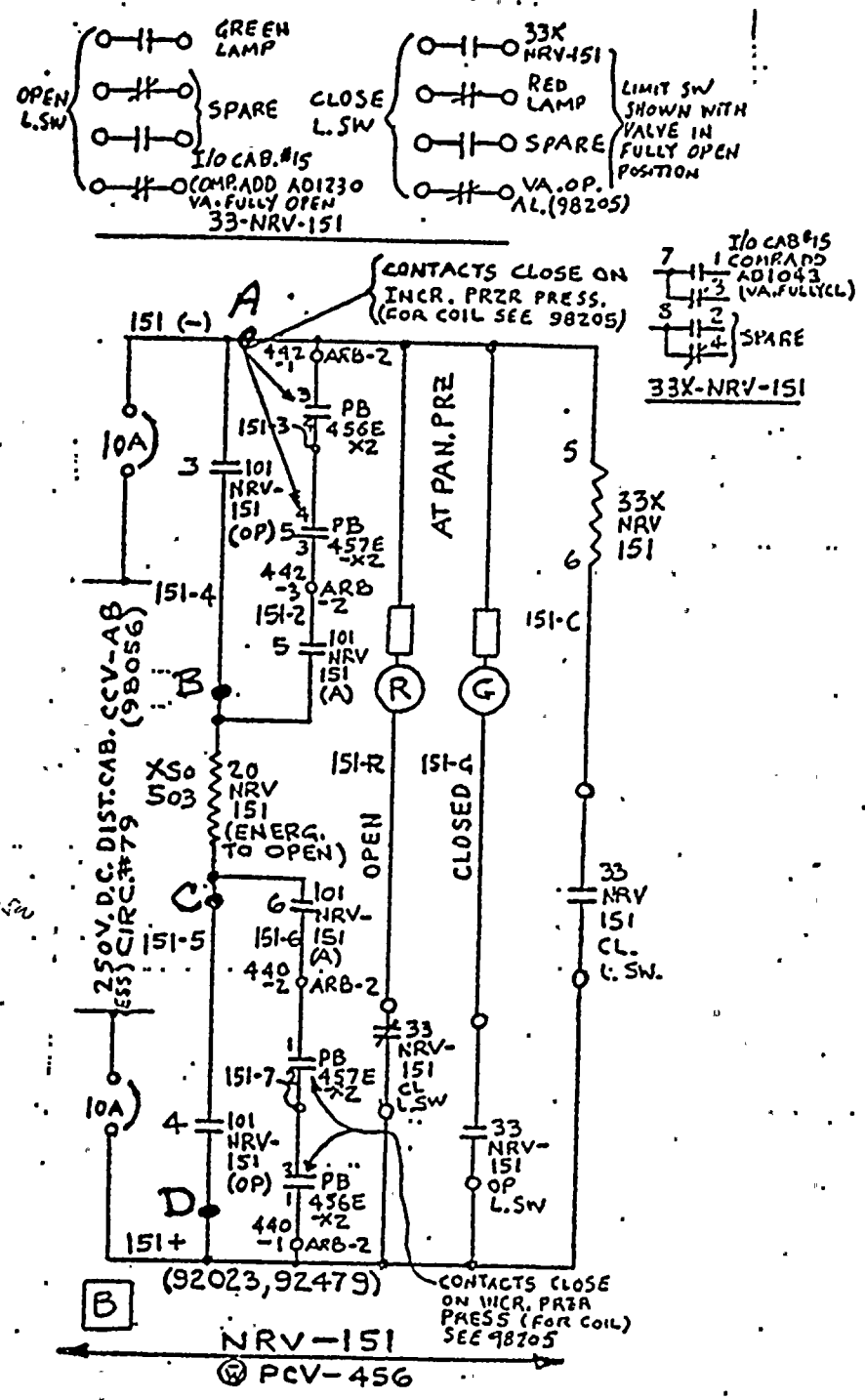
The aforementioned points A, B, C, and D are indicated on cable 9705R-1, a 12 conductor cable with each conductor individually insulated and surrounded by a common jacket.

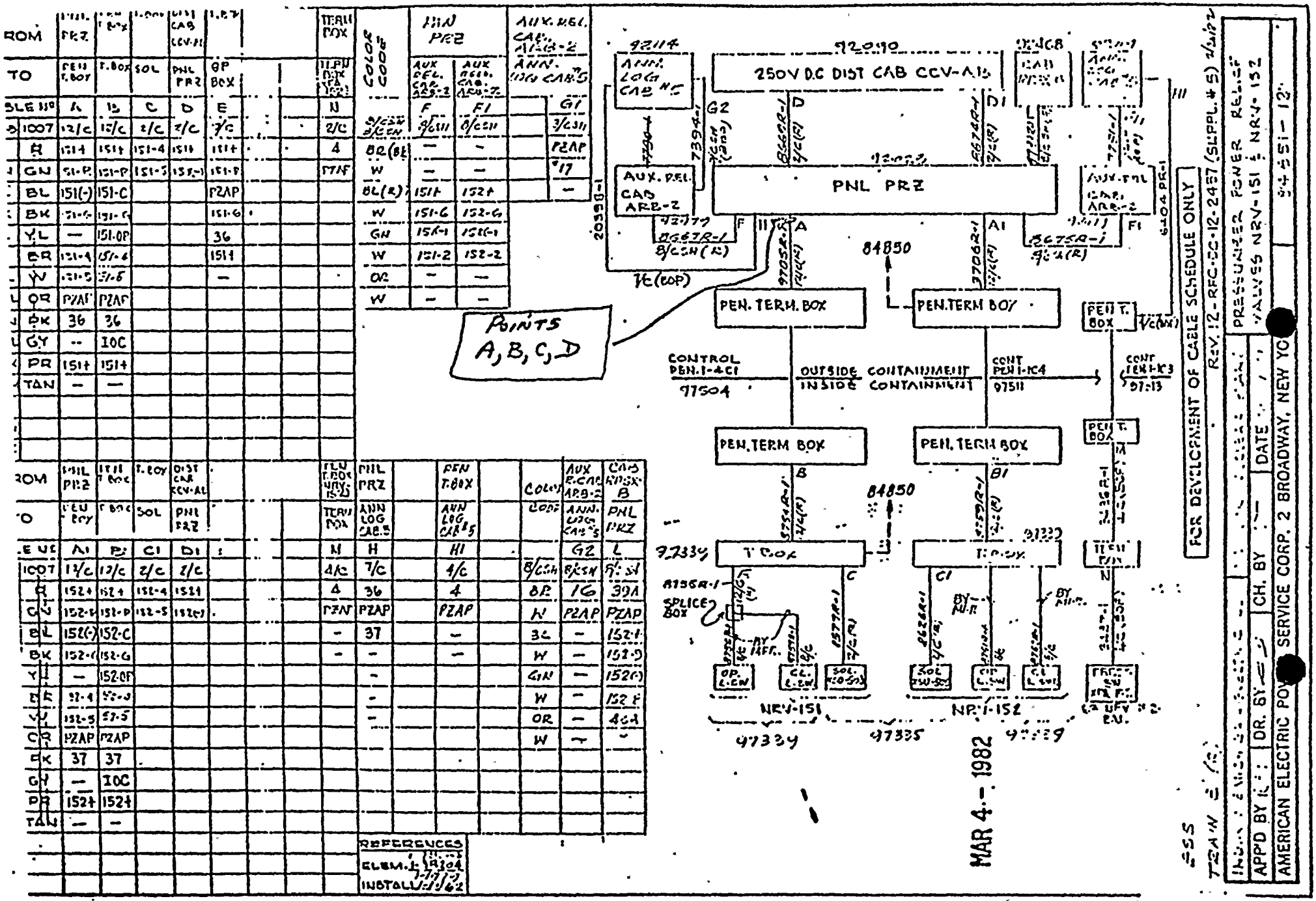
A spurious opening of the pressurizer relief valve would require a simultaneous short circuit between two (2) seperate pairs of conductors located in the same cable jacket, without the two (2) pairs shorting to each other.

The likelihood of such discriminating short circuits occuring in a single multiconductor cable is remote at best.

Benjamin Lee

7.24/BL:jal B. Lee


GREEN LAMP
OPEN L.SW
SPARE
I/O CAB.#15
(COMP.ADD AD1230 VA. FULLY OPEN
33-NRV-151
CLOSE L.SW
33K NRV-151
RED LAMP
SPARE
VA.OP. AL.(98205)
LIMIT SW SHOWN WITH VALVE IN FULLY OPEN POSITION
I/O CAB #15
COMPADD AD1043 (VA.FULLY CL)
SPARE
33X-NRV-151
CONTACTS CLOSE ON INCR. PRZR PRESS. (FOR COIL SEE 98205)
151 (-)
A
ARB-2
PB 456E X2
10A
101 NRV-151 (OP)
PB 457E X2
AT PAN. PRZ
33X NRV 151
151-4
151-2
151-C
B
101 NRV 151 (A)
R
G
250 V.D.C. DIST. CAB. CCV-AB (98056) CIRC.#79
XS0 XS03
20 NRV 151 (ENERG. TO OPEN)
151-R
151-G
OPEN
CLOSED
C
101 NRV-151 (A)
151-5
151-6
33 NRV 151 CL. L. SW.
33 NRV-151 CL.SW
151-7
PB 457E X2
33 NRV-151 OP L.SW
D
PB 456E X2
151+
(92023, 92479)
CONTACTS CLOSE ON INCR. PRZR PRESS (FOR COIL) SEE 98205
NRV-151
PCV-456


250V D.C DIST CAB CCV-A15
PNL PRZ
AUX. REL CAB ARB-2
PEN. TERM. BOX
PEN. TERM BOX
CONTROL PEN. I-4C1
OUTSIDE CONTAINMENT
INSIDE CONTAINMENT
CONT PEN I-IC4
CONT PEN I-IC3
84850
T. BOX
SPLICE BOX
NRV-151
NRV-152
POINTS A, B, C, D
FOR DEVELOPMENT OF CABLE SCHEDULE ONLY
REV. 12 - RFC-EC-12-2487 (SLPPL. # 5) 2/3/82
PRESSURIZER POWER RELIEF
VALVES NRV-151 & NRV-152
AMERICAN ELECTRIC POWER SERVICE CORP. 2 BROADWAY, NEW YO
MAR 4 - 1982

ATTACHMENT 4 TO AEP:NRC:0775G

HYDROGEN RECOMBINER QUALIFICATION

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