

REQUEST FOR ADDITIONAL INFORMATION

EQUIPMENT ENVIRONMENTAL QUALIFICATION (EEQ)  
REVIEW OF LICENSEES' RESOLUTION OF OUTSTANDING ISSUES  
FROM NRC EQUIPMENT ENVIRONMENTAL QUALIFICATION SAFETY  
EVALUATION REPORTS (SER) AND TMI ACTION PLAN INSTALLED EQUIPMENT

Virginia Power and Electric Company  
North Anna Power Station Unit 2

NRC Docket No. 50-339

December 16, 1981

NRC TAC No. 42540

Dupe of 8201290516



Franklin Research Center

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## BACKGROUND

Franklin Research Center (FRC) of Philadelphia, Pa. is providing assistance to the U.S. Nuclear Regulatory Commission (NRC) for the equipment environmental qualification (EEQ) review of operating reactors. FRC will perform an EEQ review of the Licensee's 90-day response to outstanding issues from the NRC Equipment Environmental Qualification Safety Evaluation Report (EER) and the installed TMI Action Plan equipment. The review will be limited to safety-related equipment potentially exposed to a harsh environment. The results will be presented in the form of a technical evaluation report for each plant.

This request for additional information (RFI) is the result of an evaluation of the information provided by letters dated September 4, 1981 [1], May 31, 1981 [2], and December 1, 1980 [3].\* FRC previously requested TMI Action Plan information by a telephone memorandum dated August 31, 1981 [4].

In response, VEPCO transmitted the following information on September 11, 1981 and October 8, 1981:

1. FSAR Sections 6.2.3 and 6.2.1
2. VEPCO response to NUREG-0737, Post TMI requirements dated 31-May-81
3. Qualification Documents:
  - a. Babcock & Wilcox transmittal 86-1119091-00, Relief Valve Acoustical Monitoring
  - b. Isomedix Inc., Component Testing Division, Environmental Exposure of Liquid Level Sensor dated November 17, 1975, for GEMS level detector, plant ID #LT-DAL10A & B.
  - c. Environmental test report summaries of Foxboro products, the Foxboro Company transmitters, plant ID #PT-LM110A & B.
  - d. Westinghouse Electric Corporation letter NS-SS-79287 dated November 28, 1979, subject, Qualification of Electrical Equipment for Near Term OL Plants.

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\*Numbers in brackets refer to citations found in the list of references.

e. Letter from Milton Aron (DeLaval, GEMS Sensor Division) to Arthur Murphy, Stone & Webster Engineering Corporation dated 7 May 1974.

f. GEMS level transmitter, plant ID #LT-RS-151A & B (test reports).

A. FRC REVIEW OF THE LICENSEE'S 90-DAY RESPONSE TO THE NRC EEQ SER

Information Requested

Date Received by FRC\*\*

1. In reference to the Licensee's 90-day response [1] to the NRC SER [5], a legible single copy of each of the following qualification documents is requested in order that the FRC evaluation may proceed:
  - a. Trexler, D. L., General Cable Corporation to Wright, R. D., Stone & Webster Engineering Corporation, Subject: Cable Constructions, December 22, 1971.
  - b. Chapman, L., Stone, J., Tests of Electrical Cables after Simulated Post Accident Reactor Containment Service, Cerro Wire and Cable Company, a Supplement to Franklin Institute Research Laboratories Final Report F-C2857, March 1971.
  - c. Chapman, L., Stone, J., Tests of Electrical Cables after Simulated Post-Accident Reactor Containment Service, Franklin Institute Research Laboratories, Cerro Wire and Cable Company, a Supplement to Franklin Institute Research Laboratories Final Report F-C2750, March 1970.
  - d. Learn, J. R., Boston Insulated Wire and Cable Company to Wright, R. D., Stone & Webster Engineering Corporation, 300 V Instrument Cables and 600 V Control Cables, January 17, 1972.

\*\*This column will be completed by FRC as the requested information is received.

Date Received by FRC\*\*

- e. Marth, J. R., Rockbestos Company, to Heneberry, E., Stone & Webster Engineering Corporation, Qualification of Cable for Operation During Main Steam Line Break, April 25, 1977.
- f. Lasky, J. S., The Okonite Company, to Barnhart, J. H., Stone & Webster Engineering Corporation, Cable, December 22, 1980.
- g. Cookinham, J. B., Westinghouse Corp., to Brown, S. C., Jr., VEPCO, NUREG-0588 Equipment Qualification, NAW-361, dated October 30, 1980.
- h. Electric Power Research Institute, Evaluation and Test of Improved Fire-Resistant Fluid Lubricants for Water Reactor Coolant Pump Motors, Volume 1: Fluid Evaluation, Bearing Model Tests, Motor Tests, and Fire Tests, NP-1447, Volume 1, Research Project 893-1, Interim Report, dated July 1980.
- i. Reilly, P., Stone & Webster Engineering Corporation, to Lenahan, B., Okonite Cable Corporation, Cable, August 12, 1980.
- j. Broadway, N. J., Palinchak, S., Effects of Nuclear Radiation on Elastomeric and Plastic Components and Materials, Radiation Effect Information Center, Report No. 21, Columbus, Ohio.
- k. Sheets, M. W., Topical Report on General Electric Vertical Induction Motors, Inside Containment Recirculation Spray Pumps - Surry and North Anna Stations - Third Addition to Cover Rebuilding Motors Using New Bearings, Docket Numbers 50-280 and 50-281, July 23, 1979.

Date Received by FRC\*\*

- l. Bell, C. E., General Electric Corporation, to Bonner, J., Stone & Webster Engineering Corporation, pH for Recirculation Spray Pumps, October 28, 1980.
- m. Gould-Brown Boveri, Radiation Qualification Report, S.O., No. 33-54685-RR, North Anna Power Station Unit 2, Indoor Secondary Unit Substations, December 1980.
- n. Anderson, T. M., Westinghouse Electric Corporation, to Stolz, J. F., Nuclear Regulatory Commission, NS-TMA-1950, September 29, 1978. Attachments include: Westinghouse Electric Corporation, Sensor Qualification Program IEEE 323, 1971, Demonstrating Program, Final Test Report for the Barton/ITT Modified Pressure Transmitter (Proprietary).
- o. Anderson, T. M., Westinghouse Electric Corporation, to Stolz, J. F., Nuclear Regulatory Commission, NS-TMA-2120, September 14, 1979. Attachments include: Westinghouse Electric Corporation, Supplemental Qualification Testing of Barton Lot 1 Pressure and Differential Pressure Transmitters (Proprietary).
- p. Stolz, J. F., Nuclear Regulatory Commission, to Anderson, T. M., Westinghouse Electric Corporation, Subject: Class 1E Electrical and Control Equipment, January 15, 1979.
- q. Conax Corporation, Design Qualification Test Report for a Conax Low Voltage Control Service Classification Conductor Feedthrough Assembly, P/N 7641-21001, Test Report No. IPS-353.2, June 18, 1979.



Date Received by FRC\*\*

- r. Federick, W. C., Conax Corporation, to Reilly, P., Stone & Webster Engineering Corporation, Subject: Environmental Qualification Electrical Penetrations, North Anna Units 1 and 2, January 8, 1981.
- s. Sheets, M. W., Topical Report on General Electric Vertical Induction Motors, Inside Containment Recirculation Spray Pump Motors - Surry Power Station - Second Addendum to Cover Heat Aging, Radiation Exposure, Vibration, and Steam/Chemical Spray Exposure Qualification Test, NRC Docket Nos. 50-280 and 50-281, June 12, 1973.
- t. Drab, J. B., Limitorque Corporation, to Reilly, P., Stone & Webster Engineering Corporation, Motor Operated Valves, September 19, 1980. Possible attachments include: Reilly, P., Stone & Webster Engineering Corporation, to Drab, J. Limitorque Corporation, two letters, October 10, 1980 and August 29, 1980.
- u. Drab, J. B., Limitorque Corporation, to Reilly, P., Stone & Webster Engineering Corporation, Motor Operated Valves, October 21, 1980.
- v. Excerpt from Raychem Report RT 1508/1, October 12, 1978.
- w. Maire, D. G., Westinghouse Electric Corporation, to Brown, S. C., Virginia Electric and Power Company, CH/SI Pump Motors, S.O., VRA/VGB-460, August 19, 1980.
- x. Bell, C., General Electric, telecom to Walker, F. P., Stone & Webster Engineering Corporation, Outside Recirculation Spray Motors, April 10, 1979.



Date Received by FRC\*\*

- y. Devin, P. E., Raychem Corporation, to Bonner, J., Stone & Webster Engineering Corporation, April 24, 1979.
- z. A1-75-2 Rev. 3 (P) - Thermal Hydrogen Recombiner System for Water-Cooled Reactors
- aa. A1-72-61 - Thermal Recombiner Demonstration Test
- bb. A1-73-27 - Hydrogen Recombiner for PWR Post-LOCA Application
- cc. Newcomb, R., Virginia Electric and Power Company, to MacFarlane, I., Stone & Webster Engineering Corporation, Memo concerning oil in CH/SI Pumps, dated December 31, 1980.
- dd. Lasky, J. S., The Okonite Company, to Reilly, P., Stone & Webster Engineering Corporation, August 21, 1980.
- ee. Drab, J. B., Limitorque Corporation, to Bonner, J., Stone & Webster Engineering Corporation, Telecom concerning Motor Operated Valves, October 16, 1980.
- ff. Rockwell International Report AI-ESGN139TI120010 - Operational Experience of Thermal Hydrogen Recombiner Systems and Components for PWR and BWR Mark III Reactor Systems.
- gg. Rockwell International Report AI-ESGN139TI120002 - PWR Hydrogen Recombiner Radiation Resistance.
- hh. Rockwell International Report AI-ESGN019PP120007 - Environmental Qualification Plan for Hydrogen Recombiner Motor/Blower Assembly.
- ii. Rockwell International Report AI-ESGN019PP120009 - Environmental Qualification Plan for Hydrogen Recombiners, PWR.



Date Received by FRC\*\*

- jj. Rockwell International Report  
AI-ESGN001TP000011 - Functional  
Checkout for Class 1E Motor/Blower  
Assembly.
- kk. Rockwell International Report  
AI-ESGN001TP000013 - Functional  
Checkout for Class 1E Components  
Undergoing IEEE 323-1974 Qualification  
Testing.
- ll. Brindley, J. H., Rockwell  
International, to Reilly, P., Stone &  
Webster Engineering Corp., Hydrogen  
Recombiner, July 17, 1980.
- mm. Wheeler, L. W., Rockwell International,  
to Bechet, C. T., Stone & Webster  
Engineering Corporation, reply to 81  
ESG-3176, May 19, 1981.
- nn. Wyle Laboratories, Final Qualification  
Plan for Motor/Blower Assemblies for  
Rockwell International, Energy Systems  
Group for use in Nuclear Power Station,  
Qualification Plan NES-57553, Rev. C,  
July 27, 1979.
- oo. American Environmental Company,  
Abnormal Environment Qualification Test  
Report on Series 170 Motor Control  
Centre for Klockner-Moeller Limited,  
Natick, Mass., Report STR-132778-1,  
February 5, 1979.
- pp. Stone, L. R., Rockwell International,  
to Stoll, S., Stone & Webster  
Engineering Corporation, Hydrogen  
Recombiner, May 20, 1980.
- qq. Blackwood, J. A., Foxboro Company, to  
Barachewicz, J., Stone & Webster  
Engineering Corporation, October 27,  
1980.



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- rr. Conax Corporation, Qualification Report for Electric Penetration Assemblies for North Anna Power Station - Units 1 & 2, Virginia Electric and Power Company, Conax W/O 7-02100, IPS-601, October 1980.
- ss. Drab, J. B., Limitorque Corporation, to Reilly, P., Stone & Webster Engineering Corporation, October 22, 1980.
- tt. Bartolucci, E. J., LOCA Qualification Report for Okoguard Insulated Cables and T-95 and No. 35 Splicing Tapes, Okonite Company, June 23, 1980.
- uu. Federick, W. C., Conax Corporation, to Reilly, P., Stone & Webster Engineering Corporation, November 19, 1980.
- vv. Lasky, J. S., The Okonite Company, to MacFarlen, I., Stone & Webster Engineering Corporation, Cable, October 10, 1980.
- ww. Grisdale, R. T., Stone & Webster Engineering Corporation to Whom It May Concern, December 18, 1980.
- xx. GE Radiation Resistance, Section III.
- yy. Sears, J. A. and Ramsell, Radiation Test of E10 Series Amplifiers, Standard and Radiation Resistant Types, Foxboro Company, Test Report No. T3-1097, November 1973.
- zz. Conax Corporation, Design Qualification Report for A 42 Conductor No. 18 AWG, Conax Low Voltage Service Classification Conductor Feedthrough Assembly Consistent with the Requirements of IEEE Standard 317-1976 (NRC Regulatory Guide 1.63, July 1978). IPS 353.10, November 17, 1980 (Proprietary).

Date Received by FRC\*\*

- aaa. Limitorque Corporation, Nuclear Qualification Data Sheet, November 1, 1979.
- bbb. Federick, W. C., Conax Corporation, to Bonner, J., Stone & Webster Engineering Corporation, January 5, 1980.
- ccc. McCarthy, P. T., Klockner-Moeller Corporation to Bradley, C., Stone & Webster Engineering Corporation, April 3, 1981.
- ddd. McCarthy, P. T., Klockner-Moeller Corporation to Bonner, J., Stone & Webster Engineering Corporation, January 13, 1981.
- eee. Lewicki, Reginald, Reliance Electric Company, to Barnhart, J. H., Stone & Webster Engineering Corporation, November 14, 1980.
- fff. Buckley, R., Radiation Technology, Inc., to McIntire, D., Gilbert Associates, Inc., Letter dated June 8, 1981.
- ggg. Devin, P.E., Raychem Corp. to D. McIntire, Gilbert Associates Inc., May 7, 1981.
- hhh. Okonite Company, Qualification of Okonite Ethylene - Propylene Rubber Insulation for Nuclear Plant Service, July 3, 1978.
- iii. Bell, C. E., General Electric, to J. H. Barnhart, Stone & Webster Engr. Corp. March 12, 1981, with Attachment - Qualification Report of General Electric Vertical Induction Motors for Class 1E Recirculation Spray Pumps for the North Anna Power Station, by M. W. Sheets, January 28, 1981, 492HA289.

Date Received by FRC\*\*

- jjj. Raychem Corp., A Life Assessment of Raychem Heat Shrinkable High Voltage Terminators, Report No. EDR5018, March 28, 1980.
- kkk. J. B. Drab, Limitorque Corp., to R. R. Champagne, VEPCO, June 15, 1981.
- lll. Rahman, R., Raychem Corp., to D. McIntire, Gilbert Assoc. Inc., June 25, 1981.
- mmm. General Cable Corp., General Cable Corporation Report on Radiation Resistance of Material Used in Nuclear Power and Control Cable, M. A. Durakis, May 24, 1972.
- nnn. VEPCO, Letter and Attachments, Environmental Qualification of Class 1E Equipment, North Anna Power Station, Containment Electrical Penetrations, Conax Field Splices (Includes Termination Procedure) A. L. Parrish, III, July 6, 1981.
- ooo. Maximum Emergency Environment Test Report, Conax IPS-73.4 Rev. A, 5/13/75; SCEW 24A
- ppp. Conax Test Procedure IPS-72, Rev. A, 9/24/73; SCEW 24A
- qqq. Okonite Report NQRN-3, 5-11-81
- rrr. Goruld-Boveri Letters 4-29-79 and 6-11-81
- sss. Limitorque/GAI Letter 3-3-81
- ttt. Stone and Webster Calculation ES/180; SCEW 33a
- uuu. Stone and Webster Letter 8-29-80; SCEW W-5
- vvv. Stone and Webster Calculation 12050-RP-122-0; SCEW W-42

www. Raychem Letter 4-21-81 with attached  
ENQC-126; 10/78

2. Many SCEWs pertaining to Limitorque motor-operated valves were missing information necessary for the FRC review to proceed (model no.; motor make, model, and current type; insulation type; brake model and manufacturer). FRC requests this information.

B. FRC REVIEW OF INSTALLED TMI ACTION PLAN ITEMS

Information Requested

Date Received by FRC\*\*

1. Reference 7 does not provide adequate detail with respect to identification of TMI Action Plan equipment installed after 1/1/81.

- a. Identification of TMI Action Plan equipment installed with implementation dates after 1/1/81 is requested.
- b. The correlation of these equipment items with the specific sections of NUREG-0737 [7] is requested.

[The correlation is needed to ensure that all items are included in the review, e.g., if a transmitter is identified as a TMI Action Plan item, are the cable and terminal blocks associated with the device also identified?]

- c. For all installed TMI Action Plan equipment identified and not submitted in Reference 3, a System Component Evaluation Worksheet (SCEW) (in accordance with 79-01B format) is requested.
- d. The approximate installation date for the TMI Action Plan equipment items is requested so that the appropriate qualification criteria (NUREG-0588 or DOR Guidelines) can be used in the EEQ evaluation.

(3)

2. The qualification documents, e.g., the actual test reports and associated correspondence cited as evidence of qualification listed on the SCEW sheets, for all identified TMI Action Plan equipment are requested. [The identification of those reports considered to be proprietary is requested so that proper control of documents can be maintained.]
3. Where the Licensee has a standard Owners' Group position with respect to a NUREG-0737 technical area or has requested extensions of implementation dates, this information is requested in order to incorporate it into the review.

## REFERENCES

1. R. H. Leasburg  
Letter to H. R. Denton and R. A. Clark, NRC. Subject: Response to  
Safety Evaluation Report/NUREG-0588, 90-Day Review for North Anna  
Power Station Unit 2  
Virginia Electric & Power Co., 04-Sep-81  
Serial No. 355
2. Virginia Electric and Power Company  
Response to NUREG-0737 Post TMI-Requirements  
Rev. 1, 31-May-81
3. B. R. Sylvia  
Letter to H. R. Denton, NRC. Subject: North Anna Power Station Unit  
No. 2, Response to NUREG-0588, December 1980 Revision  
Virginia Electric & Power Co., 01-Dec-80  
Serial No. 958
4. Telephone Memorandum  
C. J. Crane, J. Murphy, K. Iepson, B. Krapf (FRC) Conversation with  
L. Engle (NRC-PM), D. Smith, D. Wood (VEPCO)  
Subject: Request for Information, North Anna 1  
31-Aug-81
5. Office of Nuclear Reactor Regulation  
Safety Evaluation Report for North Anna Unit 2  
Environmental Qualification of Safety-Related  
Electrical Equipment  
NRC, 3-June-1981
6. Virginia Electric and Power Company  
Response to NUREG-0737 Post TMI-Requirements, Rev. 1  
31-May-81
7. NUREG-0737, "Clarification of TMI Action Plan Requirements"  
NRC, November 1980