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PUBLIC SERVICE COMPANY

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P.O. BOX 21666 - PHOENIX, ARIZONA 85036

August 26, 1982

ANPP-21685-GHD/BSK

U. S. Nuclear Regulatory Commission
Region V
Creekside Oaks Office Park
1450 Maria Lane - Suite 210
Walnut Creek, California 94596-5368

Attention: Mr. T. W. Bishop, Chief
Reactor Construction Project Branch

Subject: Final Report - DER 82-1
A 50.55(e) Report Relating to Ex-Core Neutron Monitor
Cables Having Greater Length and Attenuation Than Design
File: 82-019-026
D.4.33.2

Reference: (A) Telephone Conversation between J. Eckhardt and
G. Duckworth on February 16, 1982
(B) ANPP-20462, dated March 18, 1982 (Interim Report)
(C) ANPP-20965, dated May 14, 1982 (Time Extension)

Dear Sir:

Attached, is our final written report of the deficiency referenced
above, which has been determined to be Not Reportable under the
requirements of 10CFR50.55(e).

Very truly yours,

E. E. Van Brunt, Jr.
APS Vice President
Nuclear Project Management
ANPP Project Director

EEVBJr/GHD:db

Attachment

cc: See Attached Page 2

U. S. Nuclear Regulatory Commission
Attention: Mr. T. W. Bishop, Chief

August 26, 1982
ANPP-21685-GHD/BSK
Page 2

cc: Richard DeYoung, Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

T. G. Woods, Jr.
J. A. Roedel
D. B. Fasnacht
G. C. Andognini
A. C. Rogers
B. S. Kaplan
W. E. Ide
J. Vorees
J. A. Brand
A. C. Gehr
W. J. Stubblefield
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FINAL REPORT - DER 82-1
DEFICIENCY EVALUATION 50.55(e)
ARIZONA PUBLIC SERVICE COMPANY (APS)

I. DESCRIPTION OF DEFICIENCY

The Excore Neutron Monitoring System design is currently impacted by the following facts:

1. Combustion Engineering interface criteria specify a maximum cable length of 500 feet using cable meeting RG71 B/U electrical characteristics or equivalent. The 500 foot length is controlled by the attenuation of the cable which is approximately - 0.8dB/100 Ft. (at 3.0 MHz).
2. Due to the physical configuration of the system, the cable lengths from preamplifier to processing drawer are in the 700 to 800 foot range.
3. The Project Design Criteria requires that cabling be fully qualified for Class IE applications in the LOCA/MSLB environment, and meet flammability requirements per IEEE 383. The cable purchased by Bechtel procurement specification 10407-13-EM-060 meeting the design criteria is Brand-Rex Part Number CD95146; however, this cable is significantly higher in attenuation than that specified in MIL-C-17E for RG-71 B/U Coax Cable. Using this cable the installed length cannot exceed 340 feet for proper system operation.

The design as it currently exists has not been finalized and accepted by Bechtel and Combustion Engineering, since the startup/logarithmic power channels may be affected to the extent that no signal or a minimum signal is available, which would defeat the logarithmic power level trip function of the monitoring system.

II. ANALYSIS OF SAFETY IMPLICATIONS

The Excore Neutron Monitoring System design is not complete nor accepted by either Bechtel Engineering or Combustion Engineering. This system has not been submitted for turn-over for startup testing. There exists a background of design interface correspondence between Bechtel and C-E concerning this design condition. In summary, Bechtel transmitted engineering information indicating to C-E that installed cable lengths would be greater than 500 feet, and asked C-E if the system could be modified to accommodate up to 650 feet of cable length. In Attachment (A), C-E provided test data indicating the Brand-Rex cable does not meet the required electrical characteristics for long cable lengths, and in Attachment (B), Bechtel indicated to APS the proposed resolutions which would allow the design to be completed. Therefore, this condition is evaluated as Not Reportable.

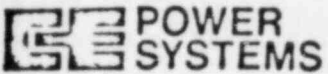
III. CORRECTIVE ACTION

APS has purchased new cable which meets the attenuation requirements for 700 to 800 foot lengths, and Unit 1 cable has been replaced under Design Change Package ISESE002. (Unit 2 cable was not installed, and has been placed on hold until additional new cable for Units 2 & 3 is delivered, currently scheduled for September 15, 1982.) This brings the design into compliance with Chapter 15 of CESSAR-F.

C-E Power Systems
Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

Tel. 203/688-1911
Telex 99297

ATTACHMENT A TO DER 82-1



December 22, 1981
V-CE-15641

Mr. W. G. Bingham
Bechtel Power Corporation
12400 East Imperial Highway
Norwalk, CA 90650

Subject: Arizona Nuclear Power Project
Excure Cable Test Program

Reference: V-CE-15530 of November 23, 1981

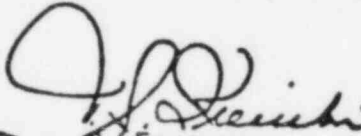
Attachment: Excure Cable Test Report

Dear Mr. Bingham:

The attachment provides the results of our test program to determine the acceptability of the current Excure System cabling as promised by the reference.

If you have any questions or comments, please call.

Very truly yours,


For C. Ferguson
Project Manager

CF/WLG:db
V-IPE-1629

cc: E. E. Van Brunt, Jr. - w/e
F. W. Hartley - w/e
W. H. Wilson
R. H. Holm
W. L. MacDonald
G. A. Butterworth
S. N. Mager
G. C. Andognini
D. B. Amerine - w/e

156992

FOR LOGS
FILE N.14.04

DEC 23 81

P	PL - DIVISION	A
3	PE SIGNS	
	APL R1111	
	APL RAJARCIA	
	APL ALET	
	RE BLACK	
	DEMO 1	
	CLARK 2	
	PUR	
	PI	
	PE/MTI EXD1	
	PA	DR
	ARCH	
	C'S	
	CONTROLS	
	ELECT	
	MELN	
	M. CLEAR	
	PLANT DESIGN	
	STR & SUP	
	CLIENT	
	PO FILE	

WTS
CE

During the week of November 9, a Cable Testing Program was performed at Westinghouse IGTD. The purpose of this Program was to evaluate the Excure System Performance with coaxial cables well in excess of the specified 500 ft. maximum interface requirement. Currently, ANPP has installed Excure Signal Cables in the 700 to 800 foot range. In addition to the physical length, it appears that a problem in the form of "Alternate" Electrical Characteristics is becoming a major factor. Several cable vendors, in order to meet flame retardant and post-accident criteria, are providing RG-71B/U "Alternate" Cable which is significantly higher in attenuation than that specified in MIL-C-17E for RG-71B/U Coax Cable. This higher attenuation, when coupled with excessive cable lengths, can result in Excure signals being reduced in amplitude below the normal noise levels.

The Excure Preamplifier output pulse can be most appropriately described by a frequency component at 3.0 MHz. This will be the limiting case for attenuation since the MSV Bandpass Filter region will result in lower attenuation values. In the pulse mode, the discriminator setpoint at the drawer must correspond to a detector pulse of 0.09pC for proper calibration. This detector pulse will produce a nominal 72 mV (peak) pulse at the preamplifier output. Based upon experience from other installations, this pulse must be at least 45 mV at the drawer input for reliable system operation. Therefore, the Cable System from the Preamplifier to the drawer must not have an attenuation of greater than -4.0 dB at 3MHz.

The specification governing RG type Coaxial Cable is MIL-C-17E. For RG71B/U Cable, the maximum attenuation is specified to be -8.0 dB per 100 ft. at 400 MHz. Using a conservative straight line approximation down to 3 MHz yields a limiting value for attenuation of -0.77 dB per 100 ft. During the Cable Test Program, four types of cable from two different manufacturers were actually tested. In addition, data on Nuclear Grade Cable has been obtained and evaluated for two additional manufacturers. Of the cables tested, all were flame retardant in accordance with IEEE-383 with one of the cables being qualified for LOCA/MSLB Service. The attenuation of these cables ranged from -0.29dB to -0.56dB per 100 feet at 3MHz. The cables tested were manufactured by Boston Insulated Wire and ITT Suprenant. Data on Nuclear Grade Cable was received from Rockbestos and Brand-Rex. The Rockbestos Cable claims to be LOCA qualified and still meet the MIL-C-17E requirements. Brand-Rex supplies "RG-XX Alternate" cables which meet the standard RG characteristic impedance but deviate in other properties, including attenuation. Re-stating the Functional Excure System requirement addressed above, the system will perform properly with up to 500 feet of Coaxial Cable which has an attenuation of approximately -0.8dB/100 ft (at 3.0 MHz). Actual usable physical length will depend directly on attenuation, with the limit that total attenuation not exceed -4.0dB.

For evaluation of the ANPP Cabling, a detailed Engineering Data Package was obtained from Brand-Rex. The data received was for an RG-71B/U Alternate, Brand-Rex Part Number CD95146. The attenuation of this cable is -22.5dB per 100 feet at 400MHz, or 2.8 times that specified in MIL-C-17E. At 3.0MHz, the attenuation is -1.18dB per 100 feet. To meet the total attenuation requirement, the installed length with this cable cannot exceed 340 feet for proper system operation.

This length is less than any of the currently planned cable runs based on information received from Bechtel. Unless the cable layout can be changed to comply with the 340 foot maximum length, it is our evaluation that the proposed cable is not acceptable for use with the Excure System.

ATTACHMENT B TO DER 82-1

bcc: W. G. Bingham
R. R. Stiens
W. J. Stubblefield
D. R. Bonano
B. L. Aley
T. E. Hartman
J. Schuh
J. T. Boyle

B/ANPP-E-84327
MOC 183340
January 27, 1982

Arizona Nuclear Power Project
P. O. Box 21666 - Mail Station 3003
Phoenix, Arizona 85036

Attention: Mr. Edwin E. Van Brunt, Jr.
APS Vice President, ANPP Project Director

Subject: Arizona Nuclear Power Project
Bechtel Job 10407
EX-Core System Cable Lengths
File: NM-001

Reference: Letter ANPP-19899-JMA/SLK, January 13, 1982

Dear Mr. Van Brunt:

Confirming our telephone discussion of January 22, 1982, we are proceeding with the following plans to achieve the problem resolution.

- 1) Arrangements are being made to conduct the field test on the installed ex-core system cables between the preamplifiers and the safety drawers. We are scheduling this test for the week ending January 29, 1982.
- 2) We are exploring the possibilities of replacing part of the cables by LOCA/MSLB qualified cables meeting the system attenuation requirements.
- 3) Adding an amplifier outside the containment will be considered as the last alternative.

We will take necessary action towards resolving the problem to meet the required schedule depending on the outcome of the field test. We will keep you informed of the progress made, cost/schedule impacts if any. Please advise if you need any additional information. This closes Bechtel action on Reference (A).

Very truly yours,

BECHTEL POWER CORPORATION
Original Signed by R. R. Stiens

for W. H. WILSON
W. H. Wilson
Project Manager
Los Angeles Power Division

W. H. Wilson
RB
RB:lcc

cc: G. C. Andognini