



**LOUISIANA**  
POWER & LIGHT

142 DELARONDE STREET  
P. O. BOX 6008 • NEW ORLEANS, LOUISIANA 70174 • (504) 366-2345

March 15, 1983

L. V. MAURIN  
Vice President Nuclear Operations

W3P83-0844  
3-A1.01.04  
Q-3-P43

Mr. T. M. Novak  
Assistant Director for Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject Louisiana Power & Light Company  
Waterford SES Unit No. 3  
Docket No. 50-382  
Installation of Fire Protection  
Envelope for Class IE Electrical Cables  
Use of the Insulco/HEMYC System

Reference: LP&L Letter W3P83-0519, dated February 14, 1983

Dear Mr. Novak:

During the NRC/LP&L/Ebasco meeting of February 17, 1983, the NRC was provided with formal responses to their four concerns regarding the HEMYC fire protective cable envelope system. However, two additional NRC concerns were identified during the subject meeting; these are stated below:

1. What affect would energizing the tested cable, with anticipated service voltage, have on the results of the fire qualification test?, and
2. What justification could be provided for the maximum tray and conduit temperature of 419°F and 406°F, respectively?

As stated previously (reference LP&L letter W3P83-0519), in response to the initial NRC concerns regarding interior envelope temperature, no firm criterion has been established for the qualification of cable protective envelopes based on temperature of the unexposed side. The qualification of the protective envelope is based on maintenance of circuit continuity and insulation resistance.

HEMYC fire qualification tests, for the one (1) hour fire protective envelope, have demonstrated that the protected cables maintained circuit continuity and that the insulation maintained adequate resistance values considering exposure to an ASTM-E-119 temperature/time test. The worst case temperature readings, for two (2) of the test cases, were 419°F (single tray/single layer of cable) and 406°F (single conduit).

Boo!

8303220004 830315  
PDR ADOCK 05000382  
F PDR

With regard to the effects of energizing the tested cable with service voltages - during the HEMYC fire qualification tests a 24 volt potential was used to monitor circuit continuity, the anticipated service voltage was not used. However, this can be justified when the results of the fire qualification test are combined with the procedure and results of the environmental qualification testing for LOCA & MSLB conditions. The LOCA/MSLB qualification test envelopes the parameters that the tested cable is exposed to during the first 50 minutes of the one (1) hour fire qualification test, as illustrated below:

- a. As indicated by the temperature profile (reference attachment 1), the temperature during environmental testing exceeds the corresponding fire qualification temperature, for time = 0 to 50 minutes. The LOCA/MSLB temperature profile continues beyond the one (1) hour mark for an extended period of time. Typical temperature/time are listed below:

346°F for 8 hours  
335°F for an additional 3 hours  
315°F for an additional 4 hours  
265°F for an additional 81 hours  
212°F for an additional 624 hour (minimum)

- b. Cable used in the LOCA/MSLB qualification test are preconditioned to simulate the effects of aging and radiation exposure. (Thermal aging is provided by subjecting the cable to elevated temperatures for a period of time, typically 350°F for seven (7) days.)
- c. During the LOCA/MSLB qualification test the cables are energized to their rated voltage capacities.
- d. Ambient pressure is maintained at elevated values (as high as 114 psig) for portions of the test.
- e. Cables are subjected to direct impingement by chemical/water spray.

It is obvious from the above description, and as illustrated on attachment 1, that the environmental qualification test provides a harsher environment than experienced during the first 40 minutes of the HEMYC fire test. The results of the environmental qualification test, which utilized preconditioned-fully energized cable, indicates that at temperatures as high as 346°F the tested cables were capable of performing their intended function. At temperatures greater than 346°F the environmental qualification test condition does not fully envelope the HEMYC fire test. However, the HEMYC tests do reveal that the PE/PVC cable tested (a lower quality than IEEE-383 cable), maintained circuit continuity; and that the insulation resistance remained well above acceptable values, subsequent to the one (1) hour fire test.

With regard to the concern of final internal temperature - The ASTM-E-119 standard time/temperature curve, used primarily for evaluating building material fire resistivity, is presently being utilized for the evaluation of fire protective system for cable tray and conduit. Although the application of the ASTM-E-119 time/temperature curve may be justified in the above case, it is not reasonable to assume that a credible fire condition, throughout the fire area of the RAB, would approach the severity which is represented by the ASTM-E-119 temperature profile for the following reasons:

- a. Combustible Loading - The Waterford 3 Fire Hazards Analysis indicates that the essential areas of the RAB, in which cable wraps will be used, contain a negligible amount of in situ combustibles. Considering the addition of a transient combustible the fire load for the area would not approach the fuel required to produce an E-119 temperature profile.
- b. Boundary Conditions - A typical E-119 furnace is designed to efficiently utilize the burned fuel by reflecting the heat back into the enclosed compartment space of the furnace (approx 6' x 8' x 5') and minimizes heat transfer through the furnace walls to the surrounding spaces. Areas of the RAB are not compartmentized nor insulated, or such, and therefore heat would be allowed to convect or radiate to surrounding spaces within the fire area.
- c. Heat Sinks - In a ASTM-E-119 fire test the heat sink consists of the test assembly itself while within the RAB numerous heat sinks are present (i.e., concrete floor and ceiling slabs, walls, equipment, supports). In addition, the RAB is provided with HVAC systems which would provide cool air into the fire area, thereby dispersing the heat and minimizing local hot spots.
- d. Sprinkler Systems - Sprinkler systems are provided in all areas of the RAB which will contain the HEMYC protective envelope. The systems are designed to discharge water at ambient air temperatures of approximately 170°F (typically) and 280°F (maximum). The sprinkler water discharge would effectively cool the area, including the surface of the HEMYC assembly, and thereby lower the expected interior envelope temperature to below and HEMYC test results.

In Summary:

- . The LOCA qualification curve envelopes the fire qualification test conditions for the first 50 minutes of testing, and accounts for energizing the cables to full voltage.
- . The temperature excursion, which occurred, during the last 10 minutes of the HEMYC test, should not be considered a probable occurrence in the unlikely event of a fire.

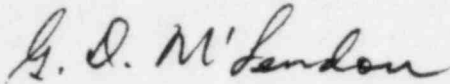
Mr. T. M. Novak  
W3P83-0844  
Page 4.

- . The HEMYC test involved PE/PVC cable, which is a lower quality cable than the IEEE-383 cable used at Waterford 3. Although rated voltage and current were not utilized during the test, the test results do indicate that circuit continuity was maintained, and subsequent "megger" tests verify that insulation resistivity was well above acceptable limits.

Therefore it is our position that the HEMYC system should be considered an acceptable means of providing a one hour fire protective envelope, based on the results of fire testing and the intended uses at the Waterford 3 Station.

If you have any questions or comments on this subject, please contact Mr. Roy Prados, our Licensing Engineering Supervisor.

Yours very truly,

*jal*   
L. V. Maurin

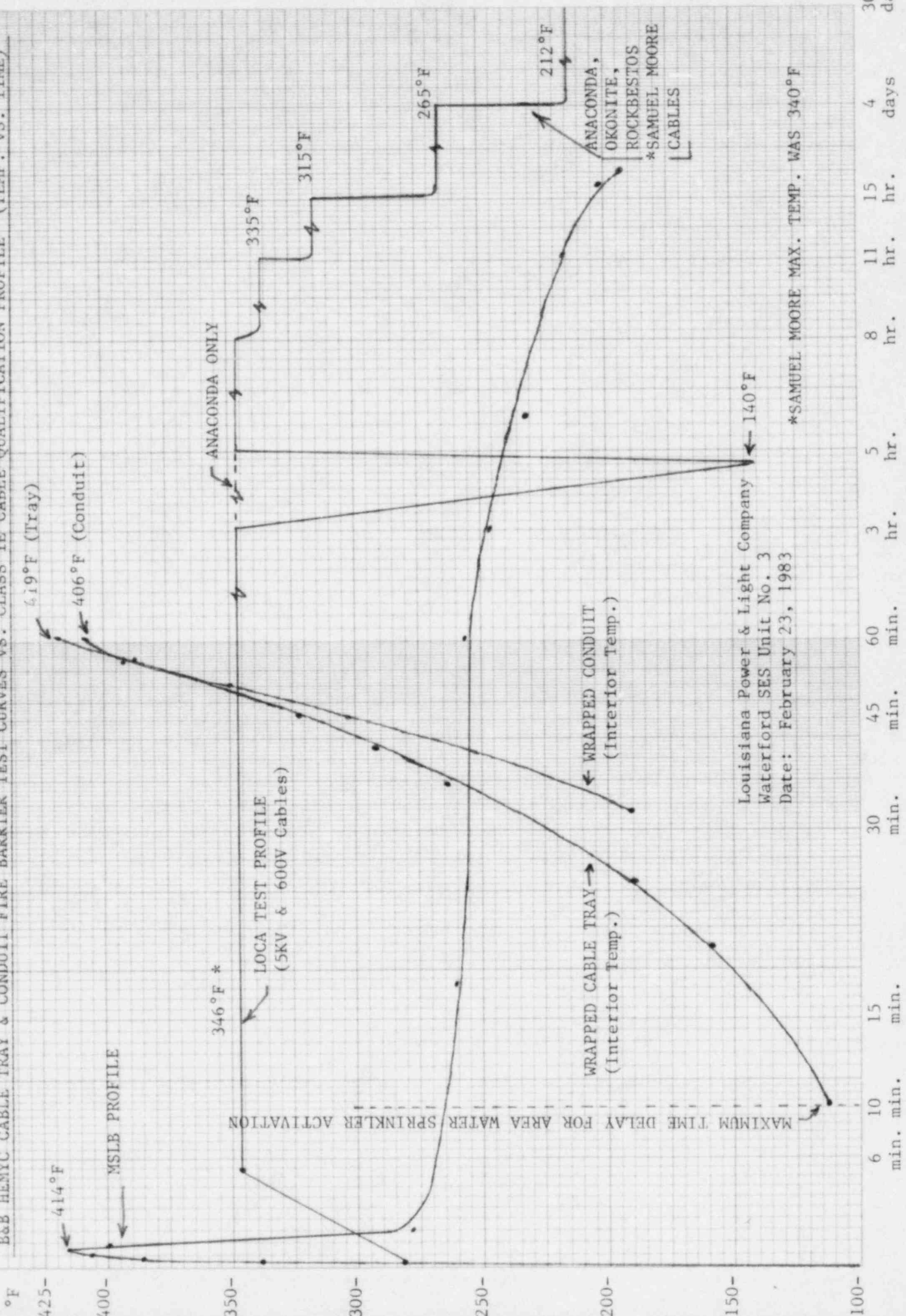
LVM/EJS/jal

Attachment

cc: E. L. Blake, W. M. Stevenson, J. Wilson, D. Kubeckie

ATTACHMENT I

B&B HEMYC CABLE TRAY & CONDUIT FIRE BARRIER TEST CURVES VS. CLASS IIE CABLE QUALIFICATION PROFILE (TEMP. VS. TIME)



Louisiana Power & Light Company  
Waterford SES Unit No. 3  
Date: February 23, 1983

\*SAMUEL MOORE MAX. TEMP. WAS 340°F



TASK REVIEW AND CERTIFICATION (TRAC) FORM

FORM # \_\_\_\_\_

TO: G. M. Wood for MIM

REFERENCES: W3P83-0519

DATE: March 15, 1983

TASK DESCRIPTION: LP&L letter W3P83-0844 will provide information to the NRC concerning the effect of the application of rated voltage to cables during a fire test.

DESCRIPTION BY: Etienne Senac DATE: March 16, 1983  
(originator)

RESPONSE REQUIRED: YES/NO DATE RESPONSE DUE: N/A

Top Section Filled Out By Originator

VERIFICATION

I certify that I have performed a review of the task described, and as a result of this review I further certify that: (Choose one or both.)

the present material status/conditions described above presently exist and that verification was made by direct observation on my part.

the report, analysis, information, or action taken described above is in fact true and valid to the best of my knowledge and belief.

Signature: D. M. Wood Date: March 16, 1983

- NOTE: (1) Verification shall be performed by a First Line Supervisor, Engineer, Section or Department Head, or Manager.
- (2) This review is in accordance with LP&L procedures and is not a part of the Quality Assurance Program.

The actions taken to accomplish the task were as follows:  
(Provide specific details, use attachments as necessary). \_\_\_\_\_

LP&L letter W3P83-0844 was reviewed.

Upon completion of the VERIFICATION STATEMENT this form is to accompany correspondence through the approval process. Once correspondence is approved, as applicable, distribution of this form shall be as follows: original to originator, copy to verifier, copy to file, other copies as necessary.