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John F. Franz, Jr.  
Vice President, Nuclear

NG-96-2597  
December 13, 1996

Mr. Frank J. Miraglia, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Station P1-37  
Washington, DC 20555-0001

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License No: DPR-49  
Response to Request for Additional Information (RAI) on the Duane  
Arnold Energy Center Thermo-Lag Related Ampacity Derating Issues

References: 1. Letter, Franz (IES) to Russell (NRC), dated June 2, 1995, "Response  
to NRC RAI Regarding Generic Letter 92-08"  
2. Letter, Kelly (NRC) to Liu (IES), dated October 16, 1996, "RAI on  
the Duane Arnold Energy Center Thermo-Lag Related Ampacity  
Derating Issues"

File: A-107, P-72a

Dear Mr. Miraglia:

Reference 1 provided information to your staff regarding the Duane Arnold Energy Center (DAEC) methodology used to calculate electrical cable ampacity derating in raceway encased in Thermo-Lag fire barrier material. Specifically, this methodology applied to raceway containing continuously energized power cables. In Reference 2, your staff requested additional information regarding Thermo-Lag related ampacity derating issues at the DAEC. Your staff requested the information to support a complete review of the ampacity of each cable evaluated by DAEC.

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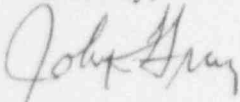
Mr. Frank J. Miraglia  
December 13, 1996  
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The purpose of this letter is to notify you that Thermo-Lag has been removed from all raceway containing continuously energized power cables. The DAEC Thermo-Lag resolution effort has eliminated reliance on fire barrier material for all but one enclosure containing continuously energized power cables. This enclosure, containing cables and penetrations, will be protected by Darmatt fire barrier material. Our ampacity derating calculation shows acceptable results.

Since the DAEC has removed Thermo-Lag from all raceway containing continuously energized power cables, it is likely your staff will not pursue further review of Reference 1. Therefore, we will not address the RAI issues on a point by point basis. The attachment to this letter, however, provides information which is relevant to our historical use of Thermo-Lag and associated ampacity derating evaluation.

Should you have any questions concerning this submittal, please contact this office.

Sincerely,



John F. Franz,  
Vice President, Nuclear

Attachment: Response to RAI Regarding Thermo-Lag Related Ampacity Derating Issues

JFF/LBS

cc: L. B. Swenzinski  
L. Root  
G. Kelly (NRC-NRR)  
A. B. Beach (Region III)  
NRC Resident Office  
Docu

## **IES Utilities**

### **Response to RAI Regarding Thermo-Lag Related Ampacity Derating Issues**

#### **Background**

Thermo-Lag 330-1 fire barrier material was installed as part of DAEC's original Appendix R modifications between 1983 and 1986. The DAEC methodology for evaluating cables protected with Thermo-Lag was developed in 1983 as part of the original installation. This preceded issuance of the Bechtel standard ("Cable Derating Practice," sheet 21, Bechtel TPO Design Guide E2.6.4, revision 2, October 29, 1984) referenced in the RAI. The DAEC methodology was based on vendor provided ampacity test data which was the only data available at the time. Following the issuance of NRC Generic Letter 92-08, the DAEC recognized that the data on which the methodology was based was suspect and planned to revise the calculation as part of the Thermo-Lag resolution effort. This revision was to have taken place following the issuance of IEEE Standard 848 and the availability of baseline test data performed in accordance with the issued standard. In the interim, the DAEC believed that sufficient margin was available to ensure that the cables within protected raceway (i.e. trays and conduits) would not be overloaded.

The watts/foot methodology was developed in conjunction with Mr. O. Esteves. Mr. Esteves performed the Bechtel Chief Engineer's review and agreed with the methodology and the extrapolation of the concept and the formulas outlined in IEEE Paper 82 JPGC 601-3, "Derating Cables in Trays Traversing Firestops or Wrapped in Fireproofing."

#### **Applicability**

The DAEC methodology considered loads to be continuously energized if the control circuit associated with the load could be continuously energized or had a long duty cycle. Loads such as pumps, compressors, fans, heaters and the like were considered as continuously energized. As the emergency core cooling pumps and diesel generators could be continuously energized, associated cables were considered to be continuously energized. No distinction was made between primary and secondary and/or spare equipment.

For Motor Control Center/Load Control Center (MCC/LCC) feeder cables, only the continuously operating loads, as described above, were imposed on the feeder cables. Loads associated with intermittently operating equipment such as sump pumps and motor operated valves were excluded from the MCC/LCC full load current because of their low duty cycle. An exception to this was made in the case of the emergency diesel generators which were considered to be operating at their continuous full load rating.

## **Discussion**

The calculation takes credit for diversity within the protected tray system. The acceptability of diversity has been debated within the power industry. IEEE paper 94 WM 100-8 PWRD, titled "Ampacity of Cables in Single Open-Top Cable Trays" provides the results of four years of field testing which appear to indicate that credit for diversity could be taken for cables in an unprotected tray system. It is reasonable to assume that this concept could be extended to a protected cable tray system. However, at this time, the DAEC does not intend to pursue this concept.

The DAEC cable ampacity for trays, at the time of the calculation, was based on Insulated Cable Engineer's Association (ICEA) ampacities for cable trays having a 30% fill in a 40°C ambient. While the watts/foot methodology presented in the Bechtel standard ("Cable Derating Practice," sheet 21, Bechtel TPO Design Guide E2.6.4, revision 2, October 29, 1984) could theoretically allow use of ampacities exceeding the ICEA standard, this lack of an upper limit was not practiced at the DAEC. In all cases, the upper limit for cable ampacity in a protected tray was set at the cable's ICEA ampacity for 30% fill. For the most part, protected trays with continuously energized power cables have significantly lower fills than 30%. In several cases, the protected tray contains only the cables evaluated in the calculation. Taking credit for tray fills below 30% would increase the available margin.

Cable in conduit at the DAEC is sized in accordance with ampacities given in the National Electric Code (NEC). In all cases, the upper limit for cable ampacity in protected conduit was set at the NEC ampacity for the specific conduit configuration.

BLIND CARBON COPY LIST FOR NG-96-2597

December 13, 1996

Rob Anderson	OC (D. Birkicht)
P. Bessette	K. Peveler
D. Curtland	K. Putnam
CIPCO	SC (W. Rose)
Corn Belt	A. Gutterman (ML&B)
CTS Project	Training Center
GDS Associates, Inc.	G. Van Middlesworth
P. Hahle/J. Easton	K. Young
D. Jantosik	J. Ertman

SUBJECT: Response to Request for Additional Information (RAI) on the Duane Arnold Energy Center Thermo-Lag Related Ampacity Derating Issues

REFERENCES:

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FILE: A-107, P-72a

**Murphy, Mary B -E08433**

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**From:** Mayhugh, Randy A -E01040  
**To:** Murphy, Mary B -E08433  
**Subject:** FW: Wondering about Cellular phones....  
**Date:** Friday, December 13, 1996 8:40AM

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**From:** Mayhugh, Randy A -E01040  
**To:** Mayhugh, Randy A -E01040  
**Subject:** RE: Wondering about Cellular phones....  
**Date:** Friday, December 13, 1996 8:13AM

I forgot to mention that you should choose a company that services your area where most the phone will be mostly used. If there aren't any of their towers within range then you will be charged a "Roam" fee for each call placed outside of the service area and that can become expensive.

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**From:** Mayhugh, Randy A -E01040  
**To:** Murphy, Mary B -E08433  
**Subject:** RE: Wondering about Cellular phones....  
**Date:** Friday, December 13, 1996 8:00AM

I have my service through 360 Communications (formally US SPRINT) located on Blairsferry Rd. I received a free phone when I signed to a one year agreement. The terms of the agreement included 20 free minutes per month for \$19.95 per month for 12 months. This type of agreement is fairly standard although there are several types of monthly agreements available that will include additional minutes with more options. Although some people will purchase the phone and then just pay as they go for usage without a contract. There are several types of phones available. Some are permanently installed in your vehicle. I prefer the portable type so that I can carry it wherever needed. I would recommend that you select one that has at a minimum 3 - 6 watts power. If I haven't answered all of your questions please give me a call at 7809. If you are reluctant to pursue this endeavor alone I would be more than happy to accompany you when shopping for one to help you make the best selection that will meet the needs of your folks.

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**From:** Murphy, Mary B -E08433  
**To:** Mayhugh, Randy A -E01040  
**Subject:** Wondering about Cellular phones....  
**Date:** Thursday, December 12, 1996 3:12PM  
**Priority:** High

Hi Randy,

Deb told me that you have a cellular phone and I am in search of information on the thing. I am looking into getting one for my parents for Christmas. I was wondering if you could tell me about what type of service you have, who is it thru, and other information you can give.

Thanks,

Bridget