Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

August 5, 1983

Mr. James G. Keppler, Regional Administrator
- Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: LaSalle County Station Units 1 and 2
Firecode CT Gypsum Cement Firestops -
Supplemental Information
I.E. Inspection Report Nos.
50-373/82-54 and 50-374/82-22
NRC Docket Nos. 50-373 and 50-374

References (a): D.L. Farrar letter to J.G. Keppler dated June 24, 1983.

(b): D.L. Farrar letter to J.G. Keppler dated July 6, 1983.

Dear Mr. Keppler:

Attached is the information that the NRC requested on the coefficient of expansion for Firecode CT Gypsum cement and cable densities in Unit 1 cable tray penetrations. This completes our response to the subject inspection reports.

Commonwealth Edison Company is prepared to discuss this and other related information with your staff. Please contact this office if further discussion is desired.

Very truly yours,

C W Schroeder 8/5/83

C. W. Schroeder
Nuclear Licensing Administrator

lm

cc: NRC Resident Inspector - LSCS

AUG 08 1983

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ATTACHMENT

Supplemental Response to Inspection Report No.'s
50-373/82-54 and 50-374/82-22

1. Cracking and Separation - Thermal Expansion

When Firecode CT Gypsum cement is heated, it will expand to fill or decrease voids in the seal. Its thermal coefficient of linear expansion is between 8.35 and 8.60 x 10^{-6} in/in/^{o}F inclusive. Gypsum cement also expands about 0.12% during setting. The attached July 21, 1983, letter from U.S. Gypsum provides additional information on this subject.

3. Cable Density - Unit 1 Wall Penetrations

As documented in reference (1), the maximum cable fill density tested in a wall penetration with a cable tray is 51%, and two Unit 1 cable tray penetrations in three-hour fire rated walls, AB2135 and AB2142, have cable fill densities greater than the tested limit. Penetrations AB2135 and AB2142 have cable fill densities of 51.4% and 52.6%, respectively. The attached July 27, 1983, Sargent and Lundy letter lists all of the Unit 1 wall penetrations with cable fill densities greater than 40%.

Both penetrations are located in the wall between the cable spreading room (fire zone 4D1) and the cable area (fire zone 5A4) at elevation 749' in the auxiliary building. This wall is approximately 12" thick, and the firestop in both penetrations consist of 5" of Firecode CT Gypsum cement and a layer of Thermafiber CT felt in the cable tray and 2" of cement and 6" of felt in the area around the cable tray.

Since the cable fill densities in these two penetrations are less than 2% above the test limit, we do not believe that the fire endurance capability of the firestops is degraded. However, to provide additional assurance that the seal meets the requirements for a three-hour fire rated barrier, we propose to enlarge the firestop in each penetration by filling in the remainder of volume in the opening with gypsum cement and felt. Thus, each penetration will contain the equivalent of two three-hour fire rated seals. This work will be completed within three months after NRC concurrence.

To prevent any other penetrations from exceeding the cable fill density limit, we will revise existing engineering procedures by December 31, 1983, to ensure that this item is reviewed in the design of modifications. The station will review its procedures and revise them as necessary to ensure that any design changes involving Safe Shutdown Analysis - required fire seals be submitted to engineering for review and approval. To assist the station, engineering is in the process of issuing electrical drawings that list all electrical firestops in fire rated walls or floors.

Tooling & Casting Division

UNITED STATES GYPSUM COMPANY
101 S. Wacker Drive
Chicago, Illinois 60606 312/321-4000

July 21, 1983

Mr. E. L. Seckinger
Commonwealth Edison - SNED
P.O. Box 767
Chicago, IL 60690

SUBJECT: LaSalle County Station
USG Fire Stop Systems
NRC Allegation Regarding Thermal Expansion

Dear Mr. Seckinger:

In reply to the NRC requesting additional information that FIRECODE CT Gypsum Cement expanded during a fire, we offer the following for their consideration.

On page 100, Table VIII, of the Manual of Lathing and Plastering, John R. Diehl AIA Author, Copyright 1960, MAC Publishers Association, refers to typical properties of gypsum as reported by the Gypsum Association in which the Thermal Coefficient of Linear Expansion is one of the properties listed (copy attached). The Thermal Coefficient of Linear Expansion ($in/in/^{o}Fx10^{-6}$) of gypsum aggregated with vermiculite aggregate ranges from 8.35 to 8.60 x 10^{-6}. FIRECODE CT Gypsum Cement is aggregated with vermiculite and falls within this range.

In addition to thermal expansion, gypsum expands during setting. FIRECODE CT Gypsum Cement has a setting expansion of 0.12% and unlike portlant cement mixes which shrink, always has a net expansion.

If you require further information, please contact me.

Very truly yours,

UNITED STATES GYPSUM COMPANY

R. L. Bartlett

R. L. Bartlett
Technical Representative

RLB/dlh
attachment

cc: #151 R. G. Lange
#173 P. G. Smith
#440-3 E. L. Whiteside

Mr. Tom Hoff
TRANSCO, Inc.
55 E, Jackson Blvd.
Chicago, IL 60604

Table VIII.

Properties of Gypsum Job-Mixed Basecoat Plasters

Property	Sand		Perlite		Vermiculite		Wood Fibered to Sand	
	1 : 2	1 : 3	1 : 2	1 : 3	1 : 2	1 : 3	1 : 0	1 : 1
Compressive Strength Pounds per sq. in.	775-1050	525-700	600-800	450-600	400-525	250-325	1750-2350	
Tensile Strength Pounds per sq. in.	150-200	100-150	165-170	90-150	130-160	70-100	280-400	240-250
Modulus of Elasticity Pounds per sq. in. x 10^6	1.0	1.15-1.20	0.21-0.33			0.028	0.65-0.75	
Density In-Place Pounds per cu. ft.	104-120	104-120	50-56	41-45	50-55	42-45	79-82	
Coefficient of Linear Expansion inches/inch/degree F x 10^{-6}	6.50	6.75	7.35	7.30	8.35	8.60	9.30	
Thermal Conductivity BTU/sq. ft./hour/°F/. inch thickness	5.51	5.60	1.64	1.31	1.74	1.42	3.15	

Source: Gypsum Association.

a relatively high percentage of cementitious material) are generally subject to greater initial shrinkage upon drying than are *lean* mixes. It is generally recommended that mixes tending toward the lean side be used for exterior plaster, due to the materials used and the presence of environmental conditions producing movement. Along with this are the more severe consequences of possible cracking resulting from movement than would be the case in interior applications.

Summary tabulations of some of the properties of gypsum plasters are in Tables VIII and IX.

MIXING THE MATERIALS

Mixing consists primarily of two operations: first, measuring the components according to the required proportions and adding them to the mixing box or machine; second, combining the components into a homogeneous mixture while adding

Table IX.

Calculated Tensile Strains at Failure for Various Gypsum Plasters[6]

Plaster Proportions	Tensile Strength Lbs./sq. in.	Modulus of Elasticity Lbs./sq. in.	Computed Tensile Strain at Failure Microinches/ in./in.
Wood-Fibered Gypsum Plaster	290	753,000	386
1 : 4 Vermiculite Brown Coat	80	175,000	457
Lime Gauging Finish Coat	70	111,000	631
1 : 2 Sand Scratch Coat	310	985,000	315
1 : 3 Sand Brown Coat	210	730,000	280

SARGENT & LUNDY
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SCE-1853
July 27, 1983
Project No. 4267-02

Commonwealth Edison Company
La Salle County Station - Unit 1

Cable Tray Fill Density for Horizontal
Cable Tray Wall Penetration Fire Seals
Part of Sargent & Lundy Punchlist Item 3.96

Mr. T. E. Watts
Commonwealth Edison Company
P. O. Box 767
Chicago, Illinois 60690

Dear Mr. Watts:

After completing our work identifying all electrical openings in Unit 1 that require fire seals, we have prepared a list of the horizontal cable tray wall penetrations that exceed 40 percent of cable tray volume. This information was requested in your letter of May 12, 1983, to Mr. R. H. Pollock.

Electrical Opening No.	Routing Drawing Number	Nearest Routing Point	Design Index	Cable Fill Density	Required By Safe Shutdown Analysis
AB2076	1E-1-3665	386B	1.25	49.1%	Yes
AB2081	1E-1-3665	445D	1.18	46.3%	Yes
AB2101	1E-1-3665	3[illegible]	1.20	47.1%	Yes
AB2135	1E-1-3667	[illegible]	1.31	51.4%	Yes
AB2142	1E-1-3667	5[illegible]	1.34	52.6%	Yes
AB2146	1E-1-366[illegible]	[illegible]	1.15	45.2%	Yes
RB2053	1E-1-365[illegible]	[illegible]	1.06	41.6%	No
RB2054	1E-1-3653	1395[illegible]	1.06	41.6%	No
AB2207	1E-1-3669	653B (Unit 2)	1.15	45.2%	Yes
AB2210	1E-1-3669	652B (Unit 2)	1.15	45.2	No
AB2023	1E-1-3663	286A	1.14	44.8%	Yes
AB2059	1E-1-3664	430A	1.24	48.7%	Yes
AB2065	1E-1-3664	426A	1.02	40.1%	Yes
TB2086	1E-1-3680	2113A	1.18	46.3%	No
TB2145	1E-1-3683	2370A	1.39	54.6%	No

The 3-hour fire walls were found using figure 9.5-1 of La Salle County FSAR Chapter 9. These 3-hour fire walls were compared with figure H.2-1 of Appendix H to verify that the 3-hour walls with electrical openings were required by the safe shutdown analysis. Cable fill density is calculated by using the following formula and is equivalent to the method specified in your letter:

$$\text{(Cable Fill Density)}\ \%\ \text{Tray Fill} = \frac{\frac{\pi}{4} \times \text{Design Index}}{2} \times 100$$

If you have any questions concerning this, please give me a call.

Yours very truly,

J. S. ESTERMAN

J. S. Esterman
Electrical Engineer

JSE:smg
In duplicate
Copies:
B. R. Shelton
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G. J. Diederich
E. L. Seckinger
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