Commonwealth Edison Company
LaSalle Generating Station
2601 North 21st Road
Marseilles, IL 61341-9757
Tel 815-357-6761

ComEd

June 2, 1995

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

Subject: LaSalle County Station Units 1 and 2
Response to the NRC Request for Additional Information Regarding Fire Testing of the Darmatt KM-1 Fire Protection System
NRC Docket Numbers 50-373 and 50-374

Reference: 1) NRC Letter dated November 17, 1994, from W. D. Reckley to D. L. Farrar

Reference (1) provided the NRC Request For Additional Information regarding the application of the Darmatt KM-1 Fire Barrier System and its planned use at LaSalle Co. Station. In response to the NRC's request, LaSalle Co. Station provides the following response:

Question No. 1 requested the following:

"Page 5, the first paragraph, "The electrical raceway assembly protected was representative . . . and included such items as cable raceways, conduits, junction boxes. . ." The staff noted that only one junction box was tested in the test specimen. Please confirm that only one JB was tested and that it is representative (i.e., size, material, mass) of the JB being protected in the plant."

Response:

Only one junction box (JB) was tested in the test specimen. The JB tested (12" by 12" by 3") is of the same size, material (i.e., galvanized steel) and mass as the JB installed in the plant. The JB was initially included in the test specimen because it was anticipated that a conduit extending from the in-plant JB, and the in-plant JB itself, may interfere with the fire barrier material necessary to protect an in-plant cable tray (i.e., the conduit

A006

and/or JB may have been a penetrating/intervening item). However, during the in-plant installation, the intervening conduit was relocated so it would not interfere with the cable tray protection. Therefore, installing the fire wrap on the JB in the plant was no longer required and the JB was not protected with the fire wrap.

Question No. 2 requested the following:

"Page 6, Section 2.2, "Protected Items," includes a list of raceway components which were tested by this test specimen. There is no mention of an air drop in this list. Please provide a detailed description of the test specimen, the raceway protected, their dimensions, raceway material composition and mass (weight), and length and diameter of the air drop. This description should identify how the fire barrier material was installed and if it was installed directly onto the raceway or if an air gap between the fire barrier material and the raceway existed and if gaps exist, the dimensions of these gaps should be identified. In addition, this description should identify the fire barrier frame construction attributes, dimensions (length, width, and height) including fire barrier fasteners (i.e., description of fasteners used, material composition, their spacing on the frame) and the details concerning the installation of the fire barrier materials to this frame."

Response:

The raceways being "protected" in the test specimen included a cable tray, a junction box, an air drop, and one conduit. Two other conduits, one tray hanger, and one I-Beam were tested as intervening components (i.e., thermal shorts). Air gaps exist when the fire barrier material does not come in direct contact with the item being protected, such as the "boxed in" portion of the cable tray and the "boxed in" conduit. Conversely, air gaps do not exist when the fire barrier material comes in direct contact with the item being protected, such as four sided cable tray wraps, and conduits in free air space (protected with semi-circular sections of material). The specific details of each "protected" raceway component were as follows:

a. Cable Tray

Material:	Galvanized Steel
Dimensions:	30" wide x 4" high (approximately 12' long)
Weight:	10.38 lbs per linear foot.
Air Gaps:	The minimum distance between the fire barrier material and the "boxed-in" portion of the cable tray was approximately 5".

b. Conduit

Material:	Galvanized Steel
Dimensions:	3/4" inside diameter.
Weight:	1.05 lbs per linear foot.
Air Gaps:	The distances between the fire barrier material and the conduit (along the length of the boxed-in conduit run) were approximately 1-7/8" along the sides and one 1" along the bottom.

c. Junction Box

Material:	Galvanized Steel
Dimensions:	12" x 12" x 3"
Weight:	10.1 lbs.
Air Gaps:	The distances between the fire barrier material and the Junction Box (JB) were approximately 2" around the sides and 5/8" across the front (of the JB).

d. Air Drop

Material: Bare Copper Conductor (8 AWG).

Length: Approximately 2" (i.e., vertical distance from the point where the conductor "drops" from the radial conduit and enters the cable tray raceway).

Air Gaps: The distance between the fire barrier material and the bare copper conductor ranged from approximately 0" to 5" (due to the angle of the air drop conductor with respect to the horizontal and vertical components of the fire barrier system).

One end of the specimen consisted of the cable tray that terminated at the left furnace wall. This portion of the tray was "boxed in" the main fire barrier envelope. The cable tray was supported from the concrete roof assembly by P1001 Unistrut Hangers. One hanger was located inside the "boxed-in" fire barrier envelope and the other was located outside the "boxed-in" fire barrier envelope. One conduit ran along the back wall of the furnace and entered through the bottom of the "boxed-in" fire barrier envelope. This conduit was protected for a distance of approximately 12" from the point where it interfaced with the barrier envelope (i.e., thermal short). At the other end of the specimen, the cable tray made a 90 degree horizontal bend, exited the "boxed in" portion of the envelope, and terminated at the front furnace wall. At the interface where the cable tray exited the "boxed in" portion it was enclosed (i.e., wrapped) on all four sides with the Darmatt KM-1 material. Also located at this end of the specimen were the junction box, the air drop, one cable tray unistrut hanger, two conduits, and one steel column. The junction box was located on the front wall (below the cable tray) and was "boxed in" with KM-1 material. The air drop conduit was routed from the top of the junction box to a position approximately 1" above the cable tray raceway. The conduit incorporated a 4"/90 degree radius bend. Dropping from the end of this conduit down into the raceway was an 8 AWG bare copper conductor. The air drop conduit was protected with Darmatt KM-1 panels. One conduit ran from the front furnace wall, across a hanger, and into the side of the cable tray. The conduit was protected with semi-circular sections of KM-1 material for a distance of 12" from the where it interfaced with the fire barrier envelope

(i.e., thermal short). The other conduit ran along the ceiling from the front furnace wall to the back furnace wall and was fully protected (i.e., "boxed in" with KM-1 material from the wall to where it entered the fire barrier envelope). The fire barrier material was installed to protect each raceway and intervening component in the following manner:

a. <u>Cable Tray</u>

For the "boxed-in" section of cable tray, the fire barrier material was not installed directly onto the raceway. The cable tray was bounded on two sides by a concrete ceiling and wall. A steel frame (2"x 2" x 0.25") was built for installing the fire barrier material around the cable tray. The steel frame was attached to the concrete using 3/8" steel anchors (Hilti Quick Bolt 2) spaced at 18" intervals (approximately). Prior to securing the framework to the concrete, KM-1 expanding gasket material was installed along the entire frame/concrete interface. Anchor pins welded to the frame were used to secure the KM-1 material to the frame. The pins were spaced at approximate intervals of 6" along the length of the frame. The panels were positioned and impaled over the pins of the frame so that the panels were flat against the frame. One speed clip washer was installed over each pin to secure the board to the frame. Pins protruding beyond the clip washer were bent over and flattened against the KM-1 panels. The installation of the second layer is identical to the installation of the first layer, except that the panels are covered with the silicone rubber fabric prior to installation and J-Hooks were installed at approximate 6" intervals along the length of each adjacent edge. The fabric was applied to the exposed panel surface, folded over its sides, and stapled to the back of the panel. Securing the fabric to the panels was augmented by the installation of the J-Hooks. Where J-Hooks were provided, adjacent pieces were tied together using the lacing wire.

For cable tray runs that were enclosed on four sides (i.e., wrapped) by the fire barrier material, adjacent sections were laced together (from one section to the next) to form one continuous fire barrier along the length of the tray being protected. The fire barrier material comes in direct contact with the cable tray. The top panel was installed first. One (or both) of the side panels was positioned and held in place by loosely lacing a few adjacent anchors (J-Hooks) along the length of

the panels. The first (innermost) layer of the cable tray side panels contained a layer of ceramic fiberboard. The fiberboard was placed against the cable tray side rail and came attached to the first layer of Darmatt KM-1 material. The bottom panel was then positioned in a similar manner, however, ceramic paper was installed on the inner most layer along the bottom of the cable tray. When the panel sections were tight up against each other, the adjacent pieces are tied together using the lacing wire and J-Hooks. The installation of the second (outer layer) was carried out in a manner identical to the installation of the first layer, except that the panels were covered with the silicone rubber fabric prior to installation.

Panels typically had their outside edges covered with an expanding gasket (as a result, each butt and corner joint automatically had a gasket between the interfaces of adjacent panels). If the expanding gasket was not already attached to the panel, the material was secured (i.e., stapled) to the edge of the panel where needed.

b. Conduit

For the boxed sections of the conduit run, an angle steel framework was used to support the KM-1 board. The frame was attached to the concrete ceiling using 3/8"steel anchors (Hilti Quick Bolt 2). Prior to securing the framework to the concrete, KM-1 expanding gasket material was installed along the entire frame/concrete interface. Anchors were installed approximately 2" from each end of the frame section and approximately 18" apart along the length of the frame. Anchor pins welded to the frame were used to secure the material to the frame. The two side panels were positioned and impaled over the pins of the frame so that the panels are flat against the frame. One speed clip washer was installed over each pin to secure the board to the frame. The side boards were gasketed against the concrete as well as the longitudinal and end (butt) joints. The front/top (or bottom) panel was positioned and impaled over the pins so that it sits flat against the frame. A speed clip washer was installed over each pin to secure this board/panel. Pins protruding beyond the clip washers were bent over and flattened against the KM-1 panels. The

installation of the second (outer layer) was carried out in a manner identical to the installation of the first layer, except that the panels were covered with the silicone rubber fabric prior to installation and J-Hooks were installed at approximate intervals of 6" along the length of each adjacent edge.

For conduit runs in free air, the fire barrier assembly consisted of two semi-circular "c-sections." The conduit wrap was installed at the start of the conduit run. The c-sections were fit around the conduit such that the circumference gaskets of both panels were at the same end. Each c-section has a KM-1 expanding gasket attached along one longitudinal and one circumferential joint on each piece. Therefore, when the two pieces were placed together, both longitudinal joints and one section end were automatically gasketed. The c-sections were then secured together using lacing wire positioned approximately 2" from each end (and approximately 9" between each tie wire). The remaining c-sections were installed by repeating this process. After the c-section were installed, the silicone rubber fabric was wrapped around the sections and secured to the panels using stainless steel cable ties.

c. Junction Box

The junction box frame was anchored to the wall using 3/8" steel anchors (Hilti Quick Bolt 2). The junction box fire barrier assembly was installed in accordance with the method described above for boxed sections of conduit runs.

d. Air Drop

Because of the close proximity of the air drop conduit to the protected cable tray, it was necessary to notch the second (outer) layer of the Darmatt KM-1 material protecting the cable tray to accommodate the conduit. Once the outer layer of the cable tray wrap was notched, two layers of Darmatt KM-1 material were installed in a manner similar to the method described above for cable tray runs wrapped on all four sides (to ensure that 2 layers of Darmatt KM-1 material were maintained over the air drop conduit).

Question No. 3 requested the following:

"Page 7, the Darmatt KM-1 system discussion, provide a complete description of the barrier materials used as part of this system. Your description should explain each component (i.e., semi-rigid endothermic reactive-insulating board, expanding paper gasket, silicone rubber coated glass cloth, thermal filler, conduit mix) and how it reacts under fire exposure."

Response:

The primary components of the Darmatt KM-1 system are the insulating boards, expanding gaskets, silicone rubber cloth, and the conduit mix. The description of each component and how it reacts under fire exposure is as follows:

a. Insulating Boards

The Darmatt KM-1 boards are semi-rigid endothermic reactive-insulating boards of 16 mm nominal thickness and have a surface density of 13 kg/m^2. Under fire exposure, multiple endothermic reactions are produced. At the same time a refractory chain interspersed with pockets of carbon dioxide is created. This reduces the thermal conductivity of the material, increases the thermal resistance in the conductors, and absorbs heat transmission with the endothermic reactions.

b. Expanding Paper Gaskets

The paper gaskets (3.2 mm thick) are installed at panel joints. Under fire exposure conditions, the material expands to fill any remaining joint gaps that are formed during the installation process.

c. Silicone Rubber Cloth

The silicone rubber fabric (also known as inconnel reinforced silicone fabric) is only provided over the outermost layer (i.e., second layer) of the Darmatt KM-1 insulating boards. The fabric is provided to increase the resistance to abrasion of the fire barrier system during normal conditions and to protect the KM-1 boards during the hose

stream test. The silicone rubber has no fire resistant properties and burns off when directly exposed to an ASTM E119 fire. The wire mesh reinforcement, however, remains intact.

d. Conduit Mix

The conduit mix (known as "KM-1 Thermal Filler") is used to fill gaps between the sections of KM-1 material (that are too large for the paper gaskets). The density, composition, and reaction under fire exposure of the mix is the same as the Darmatt KM-1 boards as described in response 3(a) above.

Question No. 4 requested the following:

"Page 7, the report indicates that adjacent panels are secured in position via lacing hooks and wire. Please provide a description of these lacing hooks, their spacing, and how they are secured to the panel. Provide material specifications for the lacing wire."

Response:

"J-Hooks" are anchoring devices installed on the Darmatt KM-1 Insulating Boards. J-Hooks are attached to the KM-1 material with stainless steel pins and are typically spaced at 6" intervals (or less). J-Hooks are normally positioned so that each has a corresponding counterpart on an adjacent panel. Lacing wire (stainless steel 18 gauge) is used to tie the opposing J-Hooks together and secure the fire barrier system.

Question No. 5 requested the following:

"Please describe how the thermocouples were attached to the raceway and the bare copper 8 American Wire Gauge (AWG) conductor. In addition, please describe the location of engineering and the qualification thermocouples on the various raceway test specimen commodities. For qualification thermocouples, please describe the criteria used to establish the individual thermocouple series and how they were averaged and reviewed against the acceptance criteria."

Response:

The test sample temperatures were monitored by glass fibre covered 24 gauge C20 type T thermocouples. The thermocouples were attached to cable trays, conduits and the junction box by securing the hot junction under a 4 mm stainless steel rivet fitted with a stainless steel washer. Thermocouples were attached to the bare copper 8 American Wire Gauge (AWG) conductor by silver soldering the hot junction to the copper. All thermocouples were qualification thermocouples (i.e., qualified materials in accordance with Generic Letter 86-10 Supplement 1 and ASTM E-119 requirements). The thermocouples were positioned as follows:

a. Cable Tray Raceway

The temperature rise was measured by thermocouples placed every 6" on the exterior surface of each tray side between the cable tray side and the fire barrier material. The internal raceway temperatures were measured by an AWG 8 bare copper conductor routed along the longitudinal center of the cable tray with thermocouples installed every 6" along the length of the copper conductor. The individual readings for the thermocouples were summed and divided by the number of thermocouples to give a mean value for each tray side and the copper conductor. Each mean value was assessed against the pass/fail criteria.

b. Conduits

The temperature rise was measured by placing thermocouples every 6" on the exterior conduit surface. The individual readings from the thermocouples were summed and divided by the number of thermocouples to produce a mean conduit temperature. The mean value was assessed against the pass/fail criteria.

c. Junction boxes - the temperature rise was measured by thermocouples placed at the geometric center of each side of the box and one thermocouple placed within 1" of the air drop penetration. A mean value was obtained by summing the individual readings and dividing by the number of thermocouples. The mean value was assessed against the pass/fail criteria.

d. Airdrops - the internal temperature was measured by a bare copper conductor routed inside the entire length of the airdrop with three thermocouples installed approximately 6" apart. The individual thermocouple readings were summed and divided by 3 to give a mean value. The mean value was assessed against the pass/fail criteria.

e. Thermal Shorts - were monitored at the point of contact with the protected items and assessed against the pass/fail criteria.

Question No. 6 requested the following:

"Page 11, "Installation of the Test Sample," the test report indicates that the fire barrier material was installed in accordance with the manufacturer's approved method. The installation procedures used to install the material were not included as part of the test documentation. Please describe the methods used to install these fire barrier materials to the test specimen and confirm that these procedures will be used to install the in-plant fire barrier material."

Response:

The methods used to install the fire barrier materials on the test specimen are described in our response to Question 2. An installation procedure (TIQAP 9.20 LS) was developed based on those methods and the manufacturers guidelines. This procedure was used for the in-plant installations.

Question No. 7 requested the following:

"Page 11, "Installation of the Test Sample," the test report indicates that a third layer of Darmatt material was used in certain areas. However, it is not clear where these areas are. Please describe the exact locations on the test specimen where this third layer of material was used, why it was applied, and where it will be used on the in-plant fire barrier system."

Response:

The cable tray stiffeners protruded into the initial panels that butted up directly against the stiffener. Therefore, two layers of 4" wide KM-1 material (a.k.a., stiffener covers or pads) were placed over the center of each stiffener in the test specimen to provide the same protection as the other members of the barrier. The horizontal portion of hangers in the test specimen had one additional 4" wide layer of KM-1 material (a.k.a., insulation pad) placed at the interface of the cable tray fire barrier and the hanger barrier (as shown in Section H-H of Figure 1d in the Faverdale Test Report). The additional material was added as an extra precaution to protect gaps that may be created if the hangers and the cable trays expanded at different rates. These additional layers were used in the same locations on the "in-plant" fire barrier system.

Additional layers of Darmatt KM-1 material were also used on the "in-plant" fire barrier system where panels butted up against a chamfered concrete barrier, and where it was necessary to notch or remove the first (inner) layer of material (i.e., to accommodate cable tray connector plates and associated hardware). The installation of the additional material ensured that the required thickness (i.e., two layers) is maintained throughout the fire barrier assembly.

Question No. 8 requested the following:

"Page 12, "Installation of the test Sample," the test report indicates that certain installation conditions, that are representative of field conditions, were included in the test specimen such as: fire barrier material ends not covered with silicon cloth, cloth stapled to the exterior of the panel in lieu of the cloth being wrapped around the panel, and holes and gaps were left unplugged. Please identify the location of these conditions and document them as an as-built condition on the test specimen."

Response:

As stated in the test report, certain installation conditions that are representative of field conditions were included in the test specimen such as: fire barrier material ends not covered with silicon cloth, cloth stapled to the exterior of the panel in lieu of the cloth being wrapped around the

panel, and holes and gaps were left unplugged. The exact locations of such conditions were not recorded on the test drawings, however, our re-review of the test documentation (notes, pictures, and video tapes) provided the following information:

a. The fabric for one panel-to-panel joint (on the bottom of the 2-sided envelope perpendicular to the tray) did not overlap the edge of the panel and the fabric was not completely covered with silicone (for an approximately 1/2" wide strip at the joint). Therefore, the cloth was stapled to the exterior of the panel (in lieu of the cloth being wrapped around the panel).

b. The corner of each exterior flat panel was not completely covered with fabric. This was because the fabric (cut from a flat sheet) is cut in such a manner that corners are sometimes formed by cutting a square corner from the corner of the fabric which fits around the panel corner. As a result (and also because of the fabric stiffness), the edges of the fabric (as they meet at the corner side edge of a panel) do not always butt up against each other. Therefore, a gap or hole may occur in the fabric on some of the flat panel corners.

c. Ends of the 3/4" free air conduit semi-circular "c-section" panels were not wrapped with fabric.

d. Holes up to 1/2" in width in the outer layer of the panel (near the hanger) were left unrepaired (i.e., not filled with thermal filler/ conduit mix) for the test.

Since it was our intent to ensure that the test specimen best represented the "in-plant" installations (to the greatest extent possible), the conditions described above were included because it was anticipated that such conditions may be encountered during the "in-plant" installation. Therefore, if the physical configuration in the plant made it necessary for these conditions to exist (i.e., fabric stapled to exterior, etc...), or if the conditions resulting from the normal installation method occurred (i.e., corners not completely covered with the fabric), they would be bounded by the tested configuration. Since the conditions represented potential general applications in the plant, it is not necessary to document them as as-built conditions on the test specimen drawings.

Question No. 9 requested the following:

"Page 13, "Hose stream Test," the test report states that the nozzle flow rate was 75 gallons per minute. Please describe how the nozzle flow rate was confirmed prior to conducting the hose stream test."

Response:

The flow rate trial test was performed prior to performing the fire test. The flow rate of 75 gallons per minute was confirmed by dividing the volume of water (75 gallons) used by the duration of the hose stream (1 minute).

Question No. 10 requested the following:

"Page 15, the report provides a table of temperature results. The table does not agree with the temperature readings measured by the thermocouples during the test. For example, the thermocouple temperature readings at time zero for side A (assumed to be the same as the table's Cable Tray Side X) range from 45°F to 49°F. However, the side A thermocouple average was 56°F. Please explain all such anomalies."

Response:

The average thermocouple readings at scan zero on page 48 of the test report were shown to be equal to zero even though the individual temperature readings were greater than zero. The Scorpio data logger used to acquire data for this test was a multi-task processing and recording device allowing eight operations at any one time. In this particular test, task 5 was set up to scan and calculate averages continuously. With such a large number of thermocouples to scan and several averages to calculate, values for the averages were not available when the printer task called for them at scan 0 (start of test). Hence, the printer task printed zeros for the average thermocouple temperatures. The individual thermocouple readings in the first scan printer task are correct and represent the temperatures recorded during the test.

The average temperatures provided on pages 15 and 46 of the test report at time zero do not agree with the temperatures provided on pages 38 through 45 at time zero. For example, the thermocouple temperature readings at

time zero for side A (i.e., the table's Cable Tray Side X) on pages 38 through 45 range from 45°F to 49°F. However, the side A thermocouple average on pages 15 and 46 is 56.8°F. The thermocouple readings at time zero on pages 38 through 45 are incorrect (i.e., slightly lower) because of the large number of thermocouples to scan and averages to calculate. Specifically, the Scorpio data logger used to acquire data for this test carries out tasks in order of priority (i.e., higher numbered tasks first). The values on pages 38 through 45 were taken from the data that was stored to disc (task 4). The averages at zero minutes on page 15 were taken from the data that was printed to paper (task 2). Due to the larger number of thermocouples and averages to calculate, a time lag occurred between the carrying out of task 4 and the carrying out of task 2 (priority given to the higher numbered task). Hence, the temperatures recorded to disk on task 4 were slightly lower that those printed to paper on task 2, and the average thermocouple temperatures at time zero provided on pages 15 and 46 represent the actual temperatures recorded during the test.

Question No. 11 requested the following:

"From the test observations, it is difficult to determine the fire barrier condition after the fire and hose stream test. Please provide a more detailed description of the visual observations made of the test specimen as it was removed from the furnace, after it was subjected to the hose stream test, and the appearance of the fire barrier material and raceway conditions noted during the post-test examination and teardown."

Response:

Following the fire test, the test assembly was carefully removed from the furnace and subjected to a hose stream test as required by Generic Letter 86-10, Supplement 1. Large amounts of steam were generated during this period of time and it was difficult see the test assembly. Immediately after the hose stream test, the test assembly was inspected. The silicone glass cloth changed from a dark gray to light gray in color and was sagging along the underside of the two sided fire barrier. All the glass cloth remained in place and was not dislodged by the hose stream test. The expanding paper gasket had expanded in the joints where it was installed and had expanded to seal the openings in the joints as desired. Small portions along the

various joints showed a dark brown color. Also, some of the gasket material had dislodged during the test. The complete outside fire barrier remained intact and showed no adverse signs as a result of the hose stream test.

After the test assembly had cooled, a post test evaluation was performed and revealed again that no damage was sustained during the hose stream test. The outer panels were removed and the inner panel had discolored at various areas. The gasket material showed discolored areas at various locations along its length. All fasteners remained secure in place on both the outer and inner layers of the KM1 material. The overall condition supported that the material met the requirements of Generic Letter 86-10, Supplement 1.

General Question No. 1 requested the following:

"Provide a comparison of the test specimen to the in-plant raceway configuration which will be protected by the Darmatt fire barrier system. This comparison should present the technical basis that establishes how the fire barrier specimens and configurations tested bound the in-plant raceway configuration."

Response:

Four Darmatt Fire Barrier Systems have been installed at LaSalle (two in each Diesel Generator Corridor). Each system is qualified by the test conducted at Faverdale Labs in Darlington, England. The system passed a one hour fire test and a five minute hose stream test, following the ASTM E119 fire curve and the performance requirements of GL 86-10, Supplement 1. The highest average temperature recorded by any set of thermocouples did not exceed 139°C (250°F) above ambient. The maximum temperature by any thermocouples did not exceed 181°C (325°F). None of the insulated items were visibly exposed after the hose stream test.

Quality controls and engineering supervision ensured that each installation at LaSalle is representative of the materials, workmanship, methods of assembly, configuration and key dimensions of the tested assembly configuration. Attachment A to this letter provides a comparison of the in-plant raceway systems versus the tested configuration.

General Question No. 2 requested the following:

"For each component of the fire barrier system (i.e., silicone rubber cloth) provide the results of flame spread and combustibility tests."

Response:

> The paper gasket material (i.e., Fiberfrax Expanding Paper) has flame spread and smoke developed ratings of 3 (when tested in accordance with ASTM E-84). The silicone rubber cloth is classified as a Class 1 material (with respect to flame spread) in accordance with the British Standard 476: Part 7. The British Standard classifications range from Class 1 to Class 5. Class 1 represents materials that are the least likely to spread fire. There is no surface burning characteristic data available for the ceramic paper (i.e., Fiber 550 Paper) used in the fire barrier system. However, similar products (i.e., same manufacturer, material composition, and intended use) have flame spread and smoke developed ratings of zero (when tested in accordance with ASTM E-84).

The Ampacity Derating Question requested the following:

"Provide Calculation 4266/19G52, Revision 0, dated March 4, 1994, that was cited in the June 2, 1994, submittal as well as any other documentation that supports the ampacity derating determination associated with Darmatt fire barrier material."

Response:

Calculation 4266/19G52, Revision 0, dated March 4, 1994, is included as Attachment B to this submittal. The calculation is conservative and bounding for the actual installation, because the calculation assumed that the Thermo Lag 1-hour fire barrier would remain in place. The Thermo Lag 1-hour fire barrier was actually removed from the cable trays.

Sargent & Lundy letter dated March 10, 1994, concerning the LaSalle County Station Power Cable Ampacity Assessment determined that "the calculated ampacities for the affected power cables are greater than their respective full load currents. This letter is attached as Attachment C.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects, these statements are not based on my personal knowledge, but on information furnished by other ComEd employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

If there are any questions or comments concerning this letter, please refer them to me at (815) 357-6761, extension 3600.

Respectfully,

R. E. Querio
Site Vice President
LaSalle Co. Station

Attachments: (A) Darmatt KM-1 Tested Configuration Versus In-Plant Installation.

(B) Sargent & Lundy Engineers, Calculation for Ampacity Derating for combination Thermo Lag 330-1 Material and Darmatt Firewrap, Calculation Number 4266/19G52, Dated March 4, 1994.

(C) Sargent & Lundy Engineers Letter, dated March 10, 1994, concerning LaSalle County Station Power Cable Ampacity Assessment.

cc: J. B. Martin, Regional Administrator, Region III
W. D. Reckley, Project Manager, NRR
P. G. Brochman, Senior Resident Inspector, LaSalle
D. L. Farrar, Nuclear Regulatory Services Manager, NORS

Attachment A

Darmatt KM-1 Tested Configuration Versus In-Plant Installation

CHARACTERISTIC	TESTED CONFIGURATION	UNIT 1 DIESEL GENERATOR CORRIDOR	UNIT 2 DIESEL GENERATOR CORRIDOR
Barrier Type	Fire	Fire	Fire
Application	Electrical Raceway Protection	Electrical Raceway Protection	Electrical Raceway Protection
Protected Item	Cable Tray	Cable Tray	Cable Tray
Dimensions	30" Wide x 4" High	1 - 30" Wide x 4" High (Note 1) 1 - 30" Wide x 6" High (Note 2)	1 - 30" Wide x 4" High (Note 1) 1 - 30" Wide x 6" High (Note 2)
Barrier Material	Darmatt KM1	Darmatt KM1	Darmatt KM1
Material Thickness	2 Layers	2 Layers	2 Layers
Fire Rating	Passed 1 Hour Test	1 Hour Desired	1 Hour Desired
Intervening Components (i.e., Thermal Shorts)	Protected for 12"	Protected for 12" (Note 3)	Protected for 12" (Note 3)
Installation Procedure	Vendor Guidelines	TIQAP 9.20 LS (Note 4)	TIQAP 9.20 LS (Note 4)

Notes:
1) This cable tray contains power cables.
2) This cable tray contains control cables.
3) If the distance between the concrete barrier and the protected raceway was less than 12", the intervening component is only protected up to the concrete barrier.
4) The procedure is based on vendor guidelines <u>and</u> lessons learned from the test specimen installation.

ATTACHMENT B

Sargent & Lundy Engineers, Calculation for Ampacity Derating for combination Thermo Lag 330-1 Material and Darmatt Firewrap, Calculation Number 4266/19G52, Dated March 4, 1994