



KANSAS GAS AND ELECTRIC COMPANY

GLENN L. KOESTER
VICE PRESIDENT - NUCLEAR

May 30, 1985

Mr. R.P. Denise, Director
Wolf Creek Task Force
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

KMLNRC 85-140
Re: Docket No. STN 50-482
Ref: 1) KMLNRC 85-031 dated 1/14/85
from GLKoester, KG&E, to RPDenise, NRC
2) KMLNRC 85-030 dated 1/14/85
from GLKoester, KG&E, to HRDenton, NRC
Subj: Clarification Regarding Raceway and Cable Separation

Dear Gentlemen:

References 1 and 2 provided a response to Inspection Report 50-482/84-51 on cable separation and the marked up Wolf Creek Final Safety Analysis Report (FSAR) changed pages required by the response. In the process of incorporating the FSAR revisions included in Reference 2, KG&E has identified a need for further clarification.

The references did not point out that a limited amount of non-safety-related lighting, communication, fire protection and speciality cable are not qualified to IEEE 383, but meet its intent in one or more of the following ways: 1) exposed cables covered with flame retardant coatings; 2) installation in a totally enclosed metal conduit system; 3) installation consisting of short lengths of exposed cable between the ends of a totally enclosed metal conduit system routed to a component and the connection to the component (e.g. at light fixtures, public address devices and computer peripherals); 4) installation in non-safety-related areas separated from safety-related areas by fire boundaries; or 5) evaluation on a case-by-case basis for adverse impact on the fire protection program.

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May 30, 1985

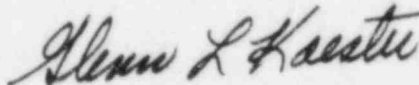
- 2 -

It has been verified that the power block and site-specific cable routing have no safety impact resulting from the non-IEEE-383 qualified cables; therefore, there is no reduction in the level of protection provided by the fire protection program as described in the FSAR.

Attachment 1 provides a revised response to Inspection Report 482/84-51. Attachment 2 provides a revised FSAR markup which will be formally incorporated into the first update of the Wolf Creek FSAR. The information in Attachments 1 and 2 supercede the information provided by References 1 and 2.

If you have any questions, please contact Mr. Otto Maynard of my staff.

Yours very truly,



Glenn L. Koester
Vice President - Nuclear

GLK:dab

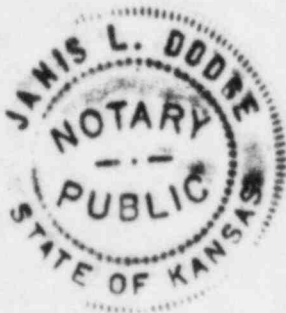
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STATE OF KANSAS)
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Glenn L. Koester, of lawful age, being first duly sworn upon oath says that he is Vice President - Nuclear and an Officer of Kansas Gas and Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said Company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Glenn L. Koester
Glenn L. Koester
Vice President - Nuclear

SUBSCRIBED and sworn to before me this 30th day of May, 1985.



Janis L. Dodge
Notary Public
Expiration Date 9.12.87

Attachment 1

VIOLATION 482/84-51: VIOLATION OF 10CFR50, APP. B, CRITERION III

Finding:

10 CFR Part 50, Appendix B, Criterion III, requires that applicable regulatory requirements and the design basis, as defined in 10 CFR 50.2 and as specified in the license application, are correctly translated into specifications, drawings, procedures, and instructions.

10 CFR 50.2 defines "design bases" as that information which identifies the specific functions to be performed by a structure, system, or component of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design.

Section 8.3.1.4.1.1 of the license application specifies that cables from different separation groups will, in accordance with IEEE Standard 384-177 (SIC) practice, be in steel conduit or enclosed raceway or separated by a fire barrier when the normal 5-foot and 3-foot horizontal separation cannot be maintained.

Section 8.1.4.3 of the license application specifies that deviations from the IEEE Standard 384-1977 practice which reduce the minimum spatial separation between circuits be supported by analysis and, in accordance with the specified Regulatory Guide 1.75-1974, be considered part of the licensee's application.

Contrary to the above, a number of nonsafety conduits to safety cable trays and cables exiting the trays did not meet the spatial requirements for cables from different separation groups in accordance with your commitment to Regulatory Guide 1.75 and IEEE-384 nor was such deviation supported by an analysis, as specified in the license application.

Revised Response:

a) Corrective steps which have been taken and results achieved:

Item 1. An analysis has been performed and the results are as follows:

The safety design basis is to protect the safety-related cables from failure of the non-safety-related circuits, and not vice-versa. In consideration of this limit, enclosing the non-safety circuits in conduit and maintaining at least 1 inch separation provides an acceptable level of protection. The conduit can contain only a limited quantity of combustible material (cable insulation & jacket). Furthermore, there is insufficient oxygen inside the conduit to support combustion of more than a fraction of the available material.

Cables are qualified to IEEE-383, except as noted below, and meet the flame retardant requirements specified within and, therefore, the cables will not support combustion. Certain non-safety-related communication, lighting,

fire protection and other specialty cables (e.g. cords, computer ribbon cable) are not qualified to IEEE-383, but are considered by KG&E to meet its intent in one of the following ways:

- 1) exposed cables covered with flame retardant coatings;
- 2) installation in a totally enclosed metal conduit system;
- 3) installation consisting of short lengths of exposed cable between the ends of a totally enclosed metal conduit system routed to a component and the connection to the component;
- 4) installation in non-safety-related areas separated from safety-related areas by fire boundaries;
- 5) evaluation on a case-by-case basis for adverse impact on the fire protection program.

Based on these considerations, it is established that 1-inch separation between a conduit containing non-safety-related circuits and an open tray containing safety-related circuits is sufficient to assure that any failure within the non-safety-related circuits will not propagate into and compromise the integrity of the safety-related circuits.

Item 2. In accordance with Regulatory Guide 1.75 this analysis will be incorporated into the Final Safety Analysis Report Section 8.1.4.3 as described in Attachment 2.

It should also be noted that in Section 8.1.4.3 in the Final Safety Analysis Report that IEEE 384-1974 is committed to and not, according to Inspection Report 50-482/84-51, IEEE 384-1977.

b) Corrective steps which will be taken to avoid further violation:

Because of the corrective steps that have been taken in part a), KG&E will be in full compliance with licensing commitments; therefore, no further corrective steps are necessary.

c) Date when full compliance will be achieved:

The FSAR change to Section 8.1.4.3 is shown in Attachment 2 and will be incorporated into the first update of the FSAR.

- b. For cable trays of different separation groups, there is a minimum vertical separation of 5 feet between open-top trays stacked vertically. In the limited number of areas where trays of different separation groups are stacked with less than 5 feet of vertical separation, a fire barrier is placed between the two separation groups. The barrier extends 1 foot to each side of the tray system (or to the wall).
- c. In the case where a tray of one separation group crosses over a tray of a different separation group and the vertical separation is less than 5 feet, a fire barrier is installed extending 1 foot from each side of each tray and 5 feet along each tray from the crossover.
- d. Where it is necessary that cables of different separation groups approach the same or adjacent control panels with less than 3-foot horizontal or 5-foot vertical spacing, isolation is maintained by installing both separation groups in steel conduit or enclosed wireway or by installing fire barriers between the separation groups. In the case of horizontal separation, the barrier extends 1 foot below the bottom of the tray (or to the floor) to 1 foot above the top of the tray (or to the ceiling). In the case of vertical spacing, the barrier extends 1 foot on each side of the tray system (or to the wall).
- e. Isolation between separation groups is considered to be adequate where physical separation is less than that indicated in Items a, b, and c above, provided the circuits of different separation groups are run in enclosed raceways that qualify as barriers or other barriers are installed between the different separation groups. The minimum distance between these enclosed raceways and between barriers and raceways is 1 inch. The barriers are installed as described in a through d above.

Insert A

CABLE SPREADING AREAS - The cable spreading area does not contain high energy equipment such as switchgear, transformers, rotating equipment, or potential sources of missiles or pipe whip and is not used for storing flammable materials. (Circuits in the cable spreading area are limited to control and instrument functions and also those power supply circuits

INSERT A

In cases of open trays containing-related cables and totally enclosed conduits containing non-safety related cables, the safety design basis is to protect the safety related cables from failure of the non-safety related circuits, and not vice-versa. In consideration of this limit, enclosing the non-safety circuits in raceway and maintaining at least one inch separation provides an acceptable level of protection. The conduit can contain only a limited quantity of combustible material (cable insulation and jacket). Furthermore, there is insufficient oxygen inside the conduit to support combustion of more than a fraction of the available material.

Based on these considerations, it is established that one-inch separation between a conduit containing non-safety related circuits and an open tray containing safety related circuits is sufficient to assure that any failure within the non-safety related circuits will not propagate into and compromise the integrity of the safety related circuits.

SNUPPS

APCSB 9.5-1 Appendix A

When safety-related cables do not satisfy the provisions of Regulatory Guide 1.75, all exposed cables should be covered with an approved fire retardant coating and a fixed automatic water fire suppression system should be provided.

- (d) Cable and cable tray penetration of fire barriers (vertical and horizontal) should be sealed to give protection at least equivalent to that fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E 119, "Fire Test of Building Construction and Materials," including the hose stream test. Where installed penetration seals are deficient with respect to fire resistance, these seals may be protected by covering both sides with an approved fire retardant material. The adequacy of using such material should be demonstrated by suitable testing.
- (e) Fire breaks should be provided as deemed necessary by the fire hazards analysis. Flame or fire retardant coatings may be used as a fire break for grouped electrical cables to limit spread of fire in cable ventings. (Possible cable derating owing to use of such coating materials must be considered during design.)
- (f) Electrical cable constructions should as a minimum pass the current IEEE No. 383 flame test. (This does not imply that cables passing the test will not require additional fire protection.)

For cable installation in operating plants and plants under construction that do not meet the IEEE No. 383 flame test requirements, all cables must be covered with an approved flame retardant coating and properly derated.
- (g) To the extent practical, cable construction that does not give off corrosive gases while burning should be used. (Applicable to new cable installations.)

SNUPPS

Safety-related cables satisfy the provisions of Regulatory Guide 1.75.

- (d) Cable and cable tray penetration of fire barriers (vertical and horizontal) are sealed to give protection at least equivalent to the barrier which they penetrate. Typical horizontal and vertical cable tray penetrations are tested to prevent the spread of fire and retain structural soundness when exposed to a 3-hour fire as discussed in 9.5.1.2.2.
- (e) Fire breaks are provided as deemed necessary by the fire hazards analysis. The cable rating is compatible with the construction of the fire break. Refer to Appendix 9.5B and Section 9.5.1.2.2.
- (f) Electrical cable passes the IEEE 383-1974 flame test *or meets the intent of this requirement as discussed in Appendix 9.5B.*
- (g) See response to D.2(c) above.

SNUPPS

APPENDIX 9.5B
FIRE HAZARDS ANALYSIS

SECTION	TITLE/DESCRIPTION	PAGE(S)
9.5B.1	Introduction	9.5B-1 through 9.5B-2
9.5B.2	Assumptions on Plant Conditions	9.5B-2 through 9.5B-3
9.5B.3	Fire Effects on Electrical Equipment and Safe Shutdown Information	9.5B-3
9.5B.4	General Information on Design Features	9.5B-3 through 9.5B-4
9.5B.5	Combustible Loadings and <i>Flame Spread</i>	9.5B-4 through 9.5B-5
9.5B.6	Fire Hazards Review Methodology	9.5B-5 through 9.5B-7
Fire Area		
A-1	Auxiliary Building - El. 1974 to 1988, General Area, Rooms 1101-1106, 1115, 1120-1125, 1128-1130, 1201-1207, 1329	9.5B-8 through 9.5B-13
2	Auxiliary Building Safety-Related Pump Area Rooms 1111-1114	9.5B-15 through 9.5B-18
3	Boric Acid Tank Rooms, Rooms 1116, 1117, 1407	9.5B-19 through 9.5B-22
4	Auxiliary Building Safety-Related Pump Area, Rooms 1107-1110	9.5B-23 through 9.5B-26
5	Auxiliary Building Stairway and Elevator (South), Room 1119	9.5B-27 through 9.5B-28
6	Auxiliary Building Stairway (North), Room 1127	9.5B-29 through 9.5B-30
7	Boron Injection Tank and Pump Room, Room 1126	9.5B-32 through 9.5B-33

SNUPPS

In most fire areas, the boundaries are defined by walls, floors, and ceilings. In the reactor building, however, such natural boundaries do not completely enclose localized fire hazards. For the fire areas inside of the containment, the provisions of Appendix R, Paragraphs III.G 2.d, e, and f were addressed.

Where a fire barrier is indicated, penetration seals in the barrier are fire rated for the same or greater time period, unless otherwise indicated.

All areas of the plant protected with water suppression systems have sufficient drainage capacity to prevent the run-off of water into other fire areas. All drains throughout the plant drain to their respective building sumps. From there, sump pumps transfer the water to the radwaste system.

Smoke and heat are assumed to be removed from areas affected by a postulated fire by the plant HVAC systems until such time that the fire dampers are actuated. Flexible duct and portable fans would be used to remove the remaining smoke to allow access to the area, as required, for manual fire fighting. The smoke would be removed via the flexible duct to an operable plant exhaust.

Equipment need times used in the fire hazards analysis are not absolute requirements and are listed to demonstrate that adequate time is available for operator action.

Emergency lighting is provided for areas which must be manned for safe shutdown and for access and egress to fire areas. It consists of sealed beam units with individual 8-hour minimum battery power supplies.

9.5B.5 COMBUSTIBLE LOADINGS AND FLAME SPREAD

Combustible loadings were determined for each room in the fire area through a review of design drawings. For each fire area, only those rooms which contain fixed or transient combustible materials and/or safe shutdown equipment are listed in the analysis. Other rooms are located and identified on the figures. The term "negligible" is used where no measurable quantity of fixed combustible material has been identified.

Although fire hazard effects on exposed conduits have been evaluated for safe shutdown, electric cable inside metal conduit has not been considered as contributing to the fire loading in the hazard areas.

SNUPPS

Noncombustible materials are defined to meet one of the following criteria:

- a. Material of which no part will burn.
- b. Surface materials not over 1/16-inch thick with a flame spread rating of 50 or less as measured by ASTM E 84-1976.
- c. Interior finishes which meet a. or are listed by an approved organization for surface flame spread of 25 or less per ASTM E 84-1976 and potential heat release of 3,500 Btu/lb or less per ASTM D 3286-1973.

The fixed combustible loading is based on the total floor area of each room. Unless indicated otherwise, the specific location of combustible material within a room is not a significant factor in the analysis.

A significant amount of the fixed combustibles in the plant is electric cable insulation. The specific calorific value for each type and size of cable was used in calculating the maximum heat loading for each fire area. The following are *typical* ~~one~~ cable insulation types used in the plant and their heat of combustion:

<u>Insulation Type</u>	<u>Range of Heat of Combustion</u>	<u>Supplier</u>
FR(HC711)	8,700 - 13,100 Btu/ft	Kerite
NS(H170)	8,450 - 23,600 Btu/ft	Kerite
XLPE	90 Btu/ft	Rockbestos
Neoprene	630 - 4,390 Btu/ft	Rockbestos
Hypalon	645 - 8,070 Btu/ft	Anaconda
Hypalon	490 - 5,080 Btu/ft	BIW
Hypalon	950 Btu/ft	Brand Rex
Hypalon	370 - 2,385 Btu/ft	Samuel Moore & Co.

All safety-related cable in the general plant area is qualified to IEEE 383-1974. All single conductors inside control panels meet the flame resistance requirements of ICEA S-19-81A

INSERT B →

¹_P or S-4-40A.

Transient combustibles are estimated based on maintenance and operations requirements. Their heat loading contribution to an area is not quantified, but they are considered as a means by which an exposure fire could occur.

9.5B.6 FIRE HAZARDS REVIEW METHODOLOGY

The SNUPPS fire hazards analysis, originally conducted in 1977, has been updated periodically as the design of the plant has been finalized. The most recent update reflects

INSERT B

Lighting, fire protection, communication and specialty cables which are flame retardant but not qualified to IEEE-383-1974; and other communication and specialty cable (e.g cords and computer ribbon cable), are limited in use in the following manner:

- A. Covered with a flame retardant coating per the requirements of (BTP) APCSB 9.5-1, Appendix A;
- B. installed in a totally enclosed metal conduit system;
- C. consist of short lengths of exposed cable between the end of a totally enclosed metal conduit system routed to a component and the connection to the component (e.g. at light fixtures, ~~and~~ public address devices);
- D. located in non-safety related areas which are separated from safety related areas by fire rated boundaries; or ^{and computer peripherals}
- E. evaluated on a case-by-case basis for adverse impact on the fire protection program.