KANSAS GAS AND ELECTRIC COMPANY
THE ELECTRIC COMPANY

GLENN L. KOESTER
VICE PRESIDENT - NUCLEAR

October 10, 1983

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

KMLNRC 83-129
Re: Docket No. STN 50-482
Ref: NRC Letter dated 9/23/83 from BJYoungblood, NRC, to GLKoester, KG&E
Subj: Wolf Creek Generating Station Emergency Plan

Dear Mr. Denton:

The Referenced letter requested additional information on the Wolf Creek Generating Station Emergency Plan. Transmitted herewith are responses to the questions in the Referenced letter.

This information will be formally incorporated into the Wolf Creek Generating Station, Unit No. 1, Final Safety Analysis Report in Revision 12. This information is hereby incorporated into the Wolf Creek Generating Station, Unit No. 1, Operating License Application.

Yours very truly,

Glenn L Koester

GLK:bb
Attach
cc: JHolonich (2)
WSchum/ASmith

A005
1/1

OATH OF AFFIRMATION

STATE OF KANSAS)
) SS:
COUNTY OF SEDGWICK)

I, Glenn L. Koester, of lawful age, being duly sworn upon oath, do depose, state and affirm that I am Vice President - Nuclear of Kansas Gas and Electric Company, Wichita, Kansas, that I have signed the foregoing letter of transmittal, know the contents thereof, and that all statements contained therein are true.

KANSAS GAS AND ELECTRIC COMPANY

ATTEST:

E.D. Prothro, Assistant Secretary

By ______________________
Glenn L. Koester
Vice President - Nuclear

STATE OF KANSAS)
) SS:
COUNTY OF SEDGWICK)

BE IT REMEMBERED, that on this 10th day of October, 1983, before me, Evelyn L. Fry, a Notary, personally appeared Glenn L. Koester, Vice President - Nuclear of Kansas Gas and Electric Company, Wichita, Kansas, who is personally known to me and who executed the foregoing instrument, and he duly acknowledged the execution of the same for and on behalf of and as the act and deed of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the date and year above written.

NOTARY PUBLIC

____
Evelyn L. Fry, Notary

My Commission expires August 15, 1984.

I. Emergency Classification System

Q.I.a The WCGS emergency plan and procedures should be revised to reflect the ability of the emergency classification and action level scheme to identify and classify an accident situation corresponding to 20% gap activity released into the core area. This change should be accompanied with an appropriate discussion of the technical bases used in determining the radiation emergency action level that corresponds to the release of 20% gap activity. It should be noted that the release of 20% gap activity in the core does not necessarily correspond to the same activity present in containment.

R.I.a The Wolf Creek Generating Station (WCGS) classification model relates event classification to the integrity of fission product barriers. Qualitative indicators of barrier status are used to assess the condition of each. The model conservatively assumes fuel barrier loss when certain indicators are present. These include:

- Significant Chemical Volume Control Systems (CVCS) letdown monitor deflection to the high scale
- Large increases above normal containment atmosphere monitor readings for noble gases, particulates and iodines
- Large rise in area radiation monitor readings around the CVCS
- Coolant sample or CVCS monitor concentrations exceeding 600 μCi/cc

These indicators relate to an event which exceeds the WCGS fuel leakage technical specifications by a multiple of approximately ten; a value selected with enough margin to allow for transients which, while above technical specifications, are not indicative of barrier loss. The model's reliance upon degrees of fuel leakage vs. percent of gap activity released make it highly sensitive to fuel damage and hence conservative.

Preliminary calculations show that for purposes of event classification, the loss of the fuel barrier is considered to occur well before the release of 20% gap activity. Table I-1 projects a gap activity released into the core area versus letdown monitor readings. Note that fuel

R.I.a (Cont'd)

barrier loss would be considered around 600 µCi/cc (10 X technical specifications) versus calculated activities of 127,000 µCi/cc for 20% gap released into the primary coolant. Similiarly, Table I-2 provides expected high range containment monitor readings versus gap activity released to the containment. The 1000 R/hr indicator value used by the model for fuel and primary coolant barrier loss relates to approximately 0.6% gap activity released to containment. A release of 20% gap corresponds to high range readings of 33,000 R/hr.

Aside from the event classification process, the determination of 20% gap activity released, is necessary for the issuance of protective action recommendations as per I&E Information Notice 83-28. It is our present intert to determine this value using primary coolant and containment atmosphere samples provided by the Post Accident Sampling System (PASS). Additionally, work is underway by a subcommittee of the Westinghouse Owner's Group to develop a methodology for Core Damage Assessment by the end of this year. Kansas Gas and Electric Company is a member of this subcommittee and we intend to evaluate the methodology developed. Appropriate revisions, detailing specific instructions on determining the 20% gap figure, to the Wolf Creek Emergency Plan and Procedures will be made depending upon the results of the Owner's Group study.

Table I-1

Subject:

Determination of letdown monitor reading for 20% gap activity released into primary coolant.

Assumptions

- Source terms are taken from the FSAR
- Instantaneous uniform mixing of gap activity released into the primary coolant is assumed.

Table I-1 (Cont'd)
Solution

Isotope	20% of Gap (Ci)
I-131	1.79 E 6
I-132	2.72 E 6
I-133	4.0 E 6
I-134	4.68 E 6
I-135	3.64 E 6
Kr-83m	2.96 E 5
Kr-85m	9.24 E 5
Kr-85	8.78 E 4
Kr-87	1.66 E 6
Kr-88	2.26 E 6
Kr-89	2.84 E 6
Xe-131m	1.85 E 4
Xe-133m	9.86 E 4
Xe-133	4.0 E 6
Xe-135m	1.11 E 6
Xe-137	3.64 E 6
Xe-138	3.4 E 6
Xe-135	3.82 E 6
TOTAL	4.1 E 7 µCi

The total activity in the primary coolant is 4.1 E 7 µCi.

This activity is diluted by the primary coolant (Volume = 3.226 E 2 m^3) so letdown monitor sees 127,000 µCi/cc.

$$4.1\text{ E }7\ \mu Ci \times \frac{1}{3.226\text{ E }2\ m^3} \times \frac{m^3}{(100)^3 cc} \times \frac{10^6\ \mu Ci}{Ci} = 127,000\ \frac{\mu Ci}{cc}$$

Table I-2

Subject:

Determine readings on high range containment monitor versus percent gap activity released into the containment.

Assumptions

- 100% of noble gases released to primary are instantaneously available in containment
- 50% of iodines in primary are available in containment; 50% of which are removed by plateout, etc.
- Activity from fuel defects is negligible compared to activity from gap release to containment
- Source terms are taken from the FSAR

Table I-2 (Cont'd)

Solution Using 20% gap released to containment

(1) Isotope	(2) Containment Activity (Ci)	(3) DCF $\left(\frac{rem\ m^3}{Ci\ sec}\right)$	.0509 X	(4) Dose Contribution (rem/hr)
I-131	4.5 10^5	8.72 10^{-2}		1.98 10^3
I-132	6.8 10^5	.513		1.78 10^4
I-133	1.0 10^6	.155		7.89 10^3
I-134	1.2 10^6	.532		3.17 10^4
I-135	9.1 10^5	.421		1.95 10^4
Kr-83m	3.0 10^5	2.4 10^{-6}		3.62 10^{-2}
Kr-85m	9.2 10^5	3.71 10^{-2}		1.74 10^3
Kr-85	8.8 10^4	5.11 10^{-4}		2.28 10^0
Kr-87	1.7 10^6	1.88 10^{-1}		1.59 10^4
Kr-88	2.3 10^6	.467		5.42 10^4
Kr-89	2.8 10^6	.527		7.51 10^4
Xe-131m	1.9 10^4	2.91 10^{-3}		2.74 10^0
Xe-133m	9.9 10^4	7.97 10^{-3}		4 10^1
Xe-133	4.0 10^6	9.33 10^{-3}		1.9 10^3
Xe-135m	1.1 10^6	9.91 10^{-2}		5.6 10^3
Xe-135	3.8 10^6	5.75 10^{-2}		1.12 10^4
Xe-137	3.6 10^6	4.51 10^{-2}		8.26 10^3
Xe-138	3.4 10^6	2.80 10^{-1}		4.35 10^4
			TOTAL	3.01 10^5

Columns (1) and (2) are determined from Table 15A-3 of the FSAR.

Column (3) is taken from Table 15A-4 of the FSAR.

Column (4) is determined by multiplying Column (3) by 0.0509 where 0.0509 is:

$$= \frac{1}{7.078\ (10^4)\ m^3} \times \frac{3600\ sec}{hr.} = .0509\ \frac{sec}{m^3 \cdot hr}$$

The total from column (4) (3.01×10^5) is the dose rate seen in the center of a semi-infinite medium. To correct for distance and shielding attenuation we refer to Murphy and Campes "Nuclear Power Plant Control Room Ventilation System Design". They give the relation,

$$D = D\gamma\infty/GF \text{ and,}$$
$$GF = 1173/V^{.338}$$

Table I-2 (Cont'd)

Where GF is the correction factor relating the dose "seen" by the monitor to the semi-infinite dose ($D\gamma\infty$ - calculated in column (4) of TABLE 1). Both high range monitors see a volume of approximately 1.7×10^6 ft^3 or

$$D = 0.11\ D\gamma\infty$$

So, for 20% gap activity, the high range monitor sees approximately 33,000 R/hr.

Note that gap activity is directly proportional to the high range monitor reading, ie., if 10% gap is released, the monitor reads approximately 16,500 R/hr.

Using this relationship, the percent gap activity released to containment corresponding to a high range monitor reading of 1000 R/hr is:

$$\frac{20\%}{33,000} = \frac{X\%}{1000} = 0.6\ \%\ \text{gap}$$

The high range monitor reads 1000 R/hr when 0.6% gap activity is in containment.

Q.I.b Because the concept of "challenge to a barrier" may in some cases lead to a nonconservative approach to declaring an emergency, this concept should be explained in greater detail in the plan. Such a discussion would necessarily include describing the relative significance of the color codes used with the Critical Safety Function Status Trees, as they concern the emergency classification system.

R.I.b Care has been taken during the development of the WCGS model to incorporate the means necessary for a conservative approach toward event classification. This has been demonstrated during an earlier submittal which evaluated each of the example initiating conditions presented in NUREG 0654, Appendix I according to the criteria provided by the model. At no time was the model less conservative then the guidance and in certain cases, it assumes a more conservative posture.

Incorporation of the Westinghouse Owner's Group Critical Safety Function Status Trees represents an element of the model which supports its conservative nature. The trees are used as a logic framework for evaluation of an event symptoms. They provide a preliminary indication of Fission Product Barrier challenge which is verified, assessed, and converted into event classification by the Fission Product Barrier Status Indicator Table. Use of the trees and the significance of their inpath color code is dependent upon the phase of the model.

The objective of Phase I is a rapid classification for discrete points in time. Red paths encountered during this period are considered by the model as a severe challenge to the barriers. As such, they are conservatively classified as a barrier loss by the Barrier Status Indicator Table even though actual breach may not yet have occurred. The model considers orange paths as indicators of barrier challenge and these paths are flagged for evaluation once Phase II is implemented.

The objective of Phase II is to evaluate potential paths of barrier loss and project times where a precautionary reclassification allows protective actions to be implemented before the barrier actually fails. Orange paths identified, during Phase I, form the starting point of this evaluation process. Passage through the trees verifies their continued existence in Phase II and projections of failure times are developed for each. Reclassification is then performed as per the model's

R.I.b (Cont'd)

basic premise of failure of one barrier equating to an Alert, two to a Site Area Emergency and three to a General Emergency.

Clarification similar to that presented in this response will be added to Section 2.4.3, discussion of the model, during the next revision of the WCGS Radiological Emergency Response Plan.

Q.I.c The emergency plan and procedures should be revised to reflect the ability to classify emergencies that are not directly related to plant malfunctions (e.g., insurgents gaining assess to vital areas).

R.I.c The Wolf Creek Generating Station (WCGS) model initially classifies events not related to plant malfunctions (ie., fires, security threats, natural phenomenon) as unusual events through use of Table 2.2-2. Further evaluation of these occurrances as to barrier challenge is performed as part of the model's Phase 2. If, in the course of this evaluation, a barrier(s) is placed in jeopardy, re-classification of the event will occur according to the methodology of Phase 2.

Central to the WCGS model is its mechanistic approach to barrier challenge. Compliance with previous NRC guidance in fire, security and other areas precludes their immediate challenge to the barriers such that an evaluation of the threat and re-classification under Phase 2 is possible. An illustrative example is as follows: Vital areas within the plant have been identified and strict security measures enacted to prevent insurgents from gaining access to locations where barrier challenge may be affected. This is part of the WCGS Security Plan which has been reviewed and accepted by the staff. Aside from demonstrating compliance with the staff's security requirements, the existance of these precautions removes the mechanistic means of direct insurgent challenge to the barriers. Should such a challenge occur, it will represent a situation similiar to those of plant malfunctions requiring analysis under Phase 2 of the model. Similiar relationships exist between fire threats and those preventative measures which are enacted as part of the WCGS Fire Plan for compliance with the staff's fire regulations.

As a result of this logic, separate treatment of events which are not directly related to plant malfunctions need only be performed during their preliminary classification, after which they enter into the model's jurisdiction and are handled similiar to all other events.