KANSAS GAS AND ELECTRIC COMPANY

GLENN L. KOESTER
VICE PRESIDENT - NUCLEAR

October 17, 1984

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

KMLNRC 84-183
Re: Docket No. STN 50-482
Ref: Letter KMLNRC 84-101 dated 07/10/84 from GLKoester, KG&E, to HRDenton, NRC
Subj: Process Control Program (PCP)

Dear Mr. Denton:

Revision 1 to tne Wolf Creek Generating Station Process Control Program (PCP) was provided to the NRC by the Reference. Discussions with members of your staff have indicated that additional information concerning the Wolf Creek PCP is required before NRC approval is obtained.

Transmitted herewith are five copies of Revision 2 to the PCP which provide the requested information. The PCP is submitted in accordance with Wolf Creek Technical Specification 6.13.1 for NRC review and approval.

This information is hereby incorporated into the Wolf Creek Generating Station, Unit No. 1, Operating License Application.

Yours very truly,

Kent R Brown

for Glenn L. Koester
Vice President - Nuclear

GLK:bb
Attach
xc:RDMartin, Region IV
PO'Connor (2)
HBundy

B001

OATH OF AFFIRMATION

STATE OF KANSAS)
) SS:
COUNTY OF SEDGWICK)

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

KANSAS GAS AND ELECTRIC COMPANY

By Kent R Brown
Kent R. Brown
Group Vice President-Technical Services

ATTEST:

E D Prothro
E. D. Prothro, Assistant Secretary

STATE OF KANSAS)
) SS:
COUNTY OF SEDGWICK)

BE IT REMEMBERED that on this 17th day of October, 1984, before me, Evelyn L. Fry, a Notary, personally appeared Kent R. Brown, Group Vice President - Technical Services 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.

EVELYN L. FRY NOTARY PUBLIC STATE OF KANSAS

Evelyn L. Fry
Evelyn L. Fry, Notary

My Commission expires on August 15, 1985.

3.5.1.2 No waste should be added to or removed from a batch tank after sampling has been performed. Should waste be added or removed from the tank prior to completing the solidification of the tank, solidification activities will be secured and the tank placed in the recirculation mode until representative samples are obtained.

3.5.1.3 The radioactive waste tank shall remain in the recirculation mode during actual solidification operations.

3.5.2 VERIFICATION SAMPLE REQUIREMENTS

3.5.2.1 Solidification sample verification will be performed on each batch of each type radioactive waste until standard cement-to-waste ratios have been developed and proven to produce acceptable products on a minimum of ten consecutive batches.

3.5.2.2 Once the standard ratios have been proven to produce acceptable solidified products for ten consecutive batches of each type radioactive waste, solidification sample verification requirements will be decreased to at least once every tenth batch of each type of radioactive waste.

3.5.2.3 Should any solidification verification sample prove to produce unsatisfactory solidified products, solidification verification sampling requirements will be increased to every batch of each type radioactive waste until the criteria of Step 3.5.2.1 are met.

3.5.3 WASTE IDENTIFICATION

3.5.3.1 Each verification sample shall be analyzed for the following minimum characteristics:

3.5.3.1.1 Oil per procedure CHM-02-450.

3.5.3.1.2 pH per procedure CHM-02-230.

3.5.3.1.3 Temperature per procedure CHM-02-230.

3.5.3.1.4 Boron content per procedure CHM-02-052 or sodium sulfate per procedures CHM-02-075 and/or CHM-02-110.

3.5.3.1.5 Isotopic analysis per procedure CHM-03-021.

3.5.3.2 The results of each sample verification will be recorded on the appropriate sample worksheets.

3.5.3.3 Wastes shall be classified in accordance with 10CFR61 per procedure HPH-09-501. Each drum shall be identified in accordance with DOT regulations for packaging and transportation of radioactive waste.

3.5.4 SOLIDIFICATION SAMPLE ACCEPTANCE CRITERIA

3.5.4.1 Visual inspection of the end product after solidification must indicate a free standing, monolithic structure which meets the free standing water criteria of the appliciable low level radioactive waste disposal facility.

3.5.4.2 The end product must resist penetration when probed with a spatula or comparable firm object.

3.5.5 SOLIDIFICATION SAMPLE VERIFICATION DOCUMENTATION

3.5.5.1 Calculate and record all required information on either the concentrates solidification work sheet or the resin solidification worksheet.

3.5.5.2 The Radwaste Coordinator or his designee shall inspect and verify the results of each sample verification.

3.6 PRIMARY CONCENTRATES VERIFICATION

3.6.1 Based on the sample analysis, determine the quantities of calcium hydroxide, calcium chloride, and lithium hydroxide required for satisfactory solidification. Record these quantities on the concentrates solidification worksheet.

3.6.2 Ensure temperature of the waste sample is greater than 140 F. Record waste sample temperature on the solidification sample verification.

3.6.3 Transfer the waste stream to the disposable container. Measure and record pH.

3.6.4 Add the required quantity of calcium hydroxide to the waste sample. Mix for five minutes.

3.6.5 Measure and record pH. If pH is less than $10.5 \pm .5$ add LiOH H_2O increments of 2 grams until pH is $10.5 \pm .5$. Record the additional LiOH H_2O required to adjust pH.

NOTE: Because of the difference in the quantity of heat of hydration released in the test sample and the full scale solidification, the test sample will not demonstrate the quantity of hardness of the full scale sample.

3.6.6 Mix sample for approximately 1 minute.

3.6.7 Record sample weight and volume on the solidification sample verification form.

3.6.8 Place a lid on the disposable beaker and allow to stand for a maximum of 24 hours at 130 F in a convection oven.

3.6.9 Inspect each sample for free standing water and product integrity. Record sample results on the solidification sample verification form.

3.6.10 If the solidification sample is satisfactory, determine the quantities of waste, thumb wheel settings, cement, calcium chloride, and lithium hydroxide to be placed in each 55 gallon drum and the quantity of calcium hydroxide to be placed in the batch tank by performing the calculations described in Section D of the concentrates solidification sample verification form.

3.6.11 If the solidification sample is not satisfactory, adjust the waste: binder ratio (Formula C.4.1.) downward in increments of .5 until a satisfactory sample verification is obtained.

3.6.12 Perform Step 3.6.10.

3.6.13 Perform full scale solidification in accordance with the system operating procedure using the boundary parameters recorded in Section D of the concentrates solidification sample verification form.

3.7 SOLIDIFICATION OF SPENT ION EXCHANGE RESIN

NOTE: If radiation levels do not permit the verification testing of the actual depleted resin, depleted non-radioactive resin may be used.

3.7.1 Determine pH, boron content, and resin to water ratio of the resin stream to be solidified and record results on the resin solidification worksheet.

3.7.2 Based on sample analysis results, determine the quantities of cement, calcium chloride, and lithium hydroxide required to obtain a satisfactory solidification. Record these quantities on the resin solidification worksheet.

3.7.3 Transfer the required quantity of waste to a disposable container.

3.7.4 Measure and record waste stream temperature.

3.7.5 Add the required quantity of calcium hydroxide to the waste stream. Mix for 5 minutes prior to adding the waste to the disposable container.

CONCENTRATE SOLIDIFICATION WORKSHEET

A. Waste Identification

Boron Content _____ ppm Test # _____

Sodium Sulfate Content _____ ppm Batch # _____

pH _____ Waste Type # _____

Temperature _____ ^{O}F Tank Id # _____

Oil (% by volume) _____ %

DATE _____ CHEMISTRY _____

B. Sample Preparation

1. Waste Sample Volume (V_{WS}) 200 ml

2. Waste Sample Volume to Concrete Volume Ratio

$$\frac{\text{Waste Volume } (V_{WS})}{\text{Concrete Volume } (V_{CS})} = \frac{0.75}{} \text{ or } \_\_\_\_$$

3. Weight of Concrete (W_{CS}) = $\frac{1}{0.75 \text{ or } \frac{\quad}{\text{Step 2B}}} \times V_{WS} \times 0.93 \frac{gm}{ml}$ = _____gm

4. Weight of Lime ($Ca(OH)_2$)

_____ ppm Boron x 3.64 x 10^{-4} = _____gm $Ca(OH)_2$

5. Weight of $LiOH \cdot H_2O$

200 ml of Waste (V_{WS}) x 0.083 = 16.6 gm $LiOH \cdot H_2O$

6. Weight of $CaCl_2$

(W_{CS}) _____gms Concrete X 0.04 = _____gm $CaCl_2$

7. pH following Addition _____ pH

8. Additional $LiOH \cdot H_2O$ required to increase pH to 10.5 $\pm$.5

_____gm $LiOH\ H_2O$

9. Total $LiOH \cdot H_2O$ required _____gm $LiOH \cdot H_2O$

10. Final Product Volume (V_{FP}) _____ ml

11. Final Product Weight (W_{FP}) _____ gm

C. Solidification Sample Results

1. Free Liquid (Free Standing H_2O) _____ % _____ ml

2. General Appearance _____

_____

3. Test Acceptable ☐ Yes ☐ No _____ / _____
Shift Chemist Date

4. Rad Waste Coordinator Review _____ / _____
Date

5. Comments _____

_____

D. Full Scale Solidification

1. Volume of Container (Vc) _____ ft^3 _____ gal.

2. Useful Volume (Vu) _____ ft^3 _____ gal.

3. Waste Volume to Concrete Volume Ratio (Waste to Binder Ratio)

0.75 or From Step B.2 _____

4. Waste Volume (V_W) in gallons.

V_{WS} (from B.1 in ml.) = 200 ml.

V_{FP} (from B.10 in ml.) = _____ml.

V_U (from D.2 in gal.) = _____gal.

$[V_{WS}/V_{FP}] \times V_U$ = _____Waste Volume in Gallons (V_W)

5. Weight of concrete (W_C)

V_W (from D.4 in gal.) _____ gal.

$W_C = V_W \times 7.75 \frac{lb}{gal}$ = _____ pounds of concrete

6. Lime--$Ca(OH)_2$

$$\frac{\text{\_\_\_\_\_ppm Boron X 1.853 X } V_W \text{ (gal) X 3.785 } \frac{\text{liters}}{\text{gal}}}{4.536 \text{ X } 10^5 \text{ mg/lb}} = \text{\_\_\_\_\_ lb Lime}$$

7. $LiOH \cdot H_2O$ (weight in pounds)

V_W (gal) X 0.6926 = _____pounds $LiOH \cdot H_2O$

8. $CaCl_2$ (weight in pounds)

W_C (lb) X 0.04 = _____pounds of $CaCl_2$

9. THUMB WHEEL SETTINGS

a. (Container Volume x 0.95) - $V_{CONCRETE}$ = First Thumb Wheel Setting

First Thumb Wheel Setting _____ Gallons

b. ($V_{WASTE} - V_{FIRST\ THUMB\ WHEEL\ SETTING}$) = Second Thumb Wheel Setting

Second Thumb Wheel Setting _____ Gallons

10. Operation Verified Thumb Wheel Setting _____ / _____
Operator Date

a. Waste Container Id #'s _____

_____ _____

11. A. Radwaste Operator _____

Date _____

B. Review by Rad Waste Coordinator

_____ _____
Rad Waste Coordinator Date

RESIN SOLIDIFICATION WORKSHEET

A. Waste Identification

% Resin Slurry $\frac{\text{Volume of Resin}}{\text{Total Volume}}$ X 100% = _____% Resin-Test #_____

Boron Content _____ppm Boron-Batch #_____

pH _____pH-Waste Type _____

Temperature _____^{O}F - Tank Id # _____

Oil(% by volume) _____%

DATE _____ CHEMISTRY_____

B. Sample Preparation

1. Waste Sample Volume (V_{WS}) [Volume of Resin] = 200 ml

2. Waste Volume to Concrete Volume Ratio

   $\frac{\text{Waste Volume } (V_{WS})}{\text{Concrete Volume } (V_{CS})}$ _____ = 0.75 or _____

3. Weight of Concrete (W_{CS}) = $\frac{1}{0.75 \text{ or } \underline{\quad}}$ x V_{WS} x 0.93 $\frac{gm}{ml}$ = _____gm
   Step B.2

4. Weight of Lime ($Ca(OH)_2$)

   _____ppm Boron x 3.64×10^{-4} = _____grams of $Ca(OH)_2$
   (Step B-4 Concentrate Solidification Sheet)

5. Weight of $CaCl_2$

   (W_{CS}) _____ gms Concrete x 0.04 = _____ gm $CaCl_2$

6. pH following Lime Addition _____ pH

7. Final Product Volume (V_{FP}) _____ ml

8. Final Product Weight (W_{FP}) _____ gms

C. Solidification Sample Results

1. Free Liquid (Free Standing water) _____ % _____ ml

2. General Appearance _____

_____

3. Test Acceptable ☐ Yes ☐ No _____ / _____
Shift Chemist Date

4. Rad Waste Coordinator Review _____ / _____
Date

5. Comments _____

_____

D. Full Scale Solidification

1. Volume of Container (V_C) _____ ft^3 _____ gal.

2. Useful Volume (V_U) _____ ft^3 _____ gal.

3. Waste Volume to Concrete Volume Ratio (Waste to Binder Ratio)

0.75 or From Step B.2 _____

4. Waste Volume (V_W) in gallons.

$$\frac{\text{Waste Volume } (V_W) \text{ ml}}{\text{Final Volume } (V_{FP}) \text{ ml}} \times \text{Useful Volume } (V_U) = \text{_____ Waste Volume gallons}$$

5. Weight of concrete (W_C)

_____ $V_W \times 7.75 \frac{lb}{gal}$ = _____ pounds of concrete
(Same as D.5 on Concentrate Solidification Sheet)

6. Weight of Lime--$Ca(OH)_2$

_____ppm Boron X 1.546 X 10^{-5} X V_W (gal) = _____pounds of Lime
(Same as step D.6 on Concentrate Solidification Sheet)

7. Weight of $CaCl_2$

Weight of Concrete (W_C) in pounds X 0.04 = _____ pounds of $CaCl_2$

8. THUMB WHEEL SETTINGS

A. (Container Volume x 0.95) - $Volume_{CONCRETE}$ = First Thumb Wheel Setting (gallons)

First Thumb Wheel Setting _____ gallons

B. Volume Waste (V_W)-$Volume_{FIRST\ THUMB\ WHEELSETTING}$ = Second Thumb Wheel Setting

Second Thumb Wheel Setting _____ gallons

9. (a) Operation Verified Thumb Wheel Setting _____/_____
Operator Date

(b) Waste Container Id #'s _____

_____

10. (a) Rad Waste Operator _____/_____
Operator Date

11. (a) Review by Rad Waste Coordinator _____/_____
Rad Waste Coordinator Date