

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

DOCKETED  
USNRC

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD \*81 NOV -9 P12:07

In the Matter of the Application of )  
Public Service Company of Oklahoma, )  
Associated Electric Cooperative, Inc. ) Docket Nos. STN 50-556  
and ) STN 50-557  
Western Farmers Electric Cooperative )  
(Black Fox Station, Units 1 and 2) )

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

AFFIDAVIT OF JOHN B. WEST, PH.D.

District of Columbia: SS

I, John B. West, of lawful age and being first  
duly sworn, depose and say that:

1. My name is John B. West. I reside at 7901  
South Yukon, Tulsa, Oklahoma. I am employed by Public  
Service Company of Oklahoma ("PSO") as Manager, Black Fox  
Station Engineering, a position I have held since 1976.  
Prior to that, I was a member of the faculty of the School  
of Chemical Engineering, Oklahoma State University, Stillwater,  
Oklahoma, for over twenty-one years. I was also employed as  
a graduate assistant for four years at the Ames Laboratory,  
Iowa State University; and by the General Electric Company  
on the Chemical and Metallurgical Program and at the Knolls  
Atomic Power Laboratory for about one year each. I received  
B.S. and Ph.D. degrees in Chemical Engineering from Iowa  
State University. I am a registered Professional Engineer in  
the State of Oklahoma.

2. I have previously testified in this proceeding with respect to Board Question 15-1 and, in particular, I have testified to my interaction with the General Electric Company with respect to determining the program for mitigating the effects of intergranular stress corrosion cracking ("IGSCC") on the reactor recirculation piping system for the Black Fox Station (See Tr. 5941-5943; and my supplemental testimony following Tr. 8582). In my previous testimony, I indicated that Public Service Company was continuing to investigate the type of stainless steel material to be used for the reactor recirculation piping system for the Black Fox Fox Station. Dr. Gordon of the General Electric Company had testified concerning mitigating measures that might be utilized when using Type 304 stainless steel for the reactor recirculation piping system. These measures were solution heat treatment, corrosion resistant cladding, and heat sink welding. My prior testimony indicated that I had reservations with respect to the use of heat sink welding and that Public Service Company of Oklahoma would review the situation to determine the most desirable solution to mitigate the effects of IGSCC.

3. Subsequent to the close of the record in this proceeding, General Electric submitted four options to PSO for consideration. These were:

- A. The type 304 stainless steel material for the recirculation system piping would be fabricated and installed, as discussed in Dr. Gordon's testimony, using IGSCC mitigating measures, i.e., solution heat treatment, corrosion resistant cladding, and heat sink welding.
- B. The type 304 stainless steel material for the recirculation system piping would be fabricated with solution heat treatment, corrosion resistant cladding, and partial replacement by 316K stainless steel. This approach would delete any use of the heat sink welding technique.
- C. The type 304 stainless steel material proposed for the recirculation system piping would be augmented by adding 316K stainless steel short-spool pieces and fittings in order to delete all heat sink welding and corrosion resistant clad weld joints.
- D. The recirculation system piping would be fabricated from 316K stainless steel in lieu of type 304. No heat sink welding

and corrosion resistant clad methods would be used.

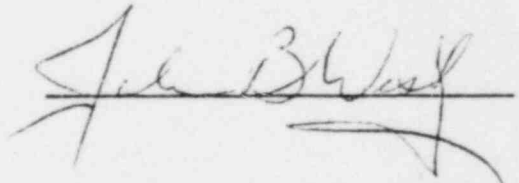
4. After consideration of the four options, I determined that option D was the most desirable and acceptable option. Option A was rejected because it includes the use of heat sink welding, a method which is unacceptable because of the lack of field experience using this welding technique. Option D is more desirable than Option B because it eliminates the fit-up and inspection problems associated with the use of corrosion resistant cladding. Option D is preferable to Option C because it reduces the number of welds, thereby minimizing the potential for IGSCC and reducing in-service inspection requirements.

5. Type 304 stainless steel may become susceptible to IGSCC during welding as a result of carbon in the material forming chromium carbide, thereby depleting chromium at the grain boundary and decreasing the material's resistance to corrosion. The potential for IGSCC can be reduced by limiting the carbon content of the stainless steel. The 316K stainless steel proposed by the General Electric Company is a material with a closely controlled low-carbon content. By closely controlling the carbon content, it is possible to retain the resistance to IGSCC while maintaining the strength of the

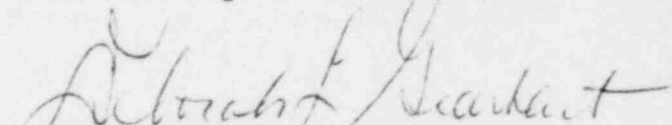
316K stainless steel equal to or better than 304 stainless steel.

6. I have concluded that option D, while the most costly of the alternatives, provides the best currently available technical solution to mitigate IGSCC problems. I recommended to the Executive Vice President that PSO select 316K stainless steel for the recirculation system piping for Black Fox Station. My recommendation was accepted by the Executive Vice President on July 27, 1979, and he directed that steps be taken to revise the contract with the General Electric Company to specify the use of 316K material for the Black Fox Station reactor recirculation system. This was accomplished soon after that date. The fabrication of most of the recirculation system piping using 316K stainless steel for Units 1 and 2 has been completed, and it is being stored at the Black Fox Station site.

Executed at Washington, D. C.



Subscribed and sworn to before me this 5th day of November, 1981.



Notary Public in and for  
the District of Columbia

My commission expires 5-14-84.

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)  
(Black Fox Station, Units 1 and 2) )

CERTIFICATE OF SERVICE

I hereby certify that copies of APPLICANTS'  
MOTION TO REOPEN THE RECORD in the above-captioned pro-  
ceeding were served upon the persons shown below by deposit  
in the United States mail, first-class postage prepaid, this  
5th day of November, 1981.

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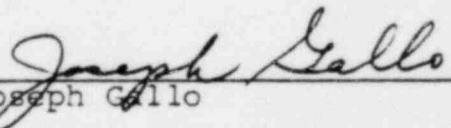
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