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TO: Mr. E. Case

FROM: Duke Power Co.
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ENCLOSURE Info & evaluation concerning fracture toughness of the steam generator & reactor coolant pumps support materials & with attached drawings & supporting info.... 6 inches

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WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

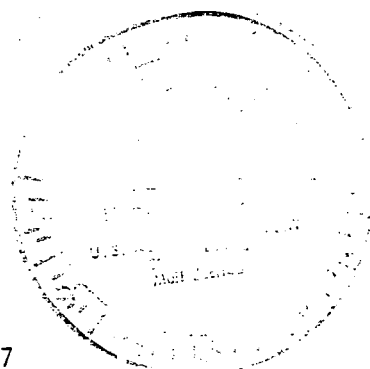
March 1, 1978

TELEPHONE: AREA 704
373-4083

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. R. Reid, Chief
Operating Reactor Branch #4

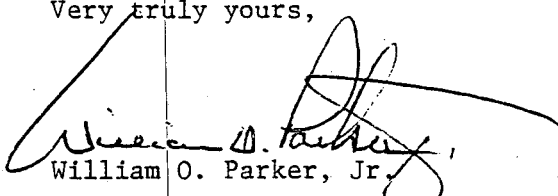
Reference: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287



Dear Sir:

With regard to your letter dated October 4, 1977, please find attached information and evaluation concerning fracture toughness of the steam generator and reactor coolant pumps support materials of the Oconee Nuclear Station.

Very truly yours,


William O. Parker, Jr.

RLG:ge

Attachments

780680088

ATTACHMENT 1

ATTACHMENT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION CONCERNING FRACTURE TOUGHNESS OF STEAM GENERATOR AND REACTOR COOLANT PUMP SUPPORT MATERIALS

OCONEE NUCLEAR STATION

1. Provide engineering drawings of the steam generator and reactor coolant pump supports sufficient to show the geometry of all principal elements. Provide a listing of materials of construction.

Response:

Engineering drawings of the steam generator and reactor coolant pump supports are included as part of Attachment 2. Drawings indicating the materials of construction are also included.

2. Specify the detailed design loads used in the analysis and design of the supports. For each loading condition (normal, upset, emergency and faulted), provide the calculated maximum stress in each principal element of the support system and the corresponding allowable stresses.

Response:

Loading for steam generator support skirt - MK No. 97 were as follows:

	<u>Normal & Upset</u>	<u>Emergency</u>	<u>Faulted</u>
Design	OK	Uplift - 1.888 KIPs Overturning moment - 40,080 IN-KIPs	Uplift - 2,015 KIPs Overturning moment - 250,000 IN-KIPs
Calculated Max Stress	OK	OK	14 KSI
Allowable Stress	17 KSI	13.5 KSI (Primary Membrane Only)	24.5 KSI

The steam generator top lateral supports are subject to a maximum bending stress of 44.7 KSI. The reactor coolant pump support design criteria is indicated on Drawing OM-100-223 (Attachment 2).

3. Describe how all heavy section intersecting member weldments were designed to minimize restraint and lamellar tearing. Specify the actual section thicknesses in the structure and provide details of typical joint designs.

State the maximum design stress used for the through-thickness direction of plates and elements of rolled shapes.

Response:

There is no major loading on the steam generator skirt to show cause for concern about lamellar tearing.

4. Specify the minimum operating temperature for the supports and describe the extent to which material temperatures have been measured at various points on the supports during the operation of the plant.

Response:

No minimum operating temperature were specified for support materials.

5. Specify all the materials used in the supports and the extent to which mill certificate data are available. Describe any supplemental requirements such as melting practice, toughness tests and through-thickness tests specified. Provide the results of all tests that may better define the properties of the materials used.

Response:

Materials used were as follows. All material meets the criteria in section II of the ASME Code.

<u>NSS-3</u>	<u>Part #</u>	<u>Specification</u>	<u>Mill Cert. Available</u>	<u>Special Test Results</u>
Support Skirt	96	SA302,GRB	Yes	None
Gusset Plate	98	SA515,GR.70	Yes	None
Base Plate	97	SA515,GR.70	Yes	None
<u>NSS-4</u>	<u>Part #</u>	<u>Specification</u>	<u>Mill Cert. Available</u>	<u>Special Test Results</u>
Support Skirt	96	SA302,GRB	Yes	None
Gusset Plate	98	SA515.70	Yes	None
Base Plate	97	SA515,GR.70	Yes	None
<u>NSS-9</u>	<u>Part #</u>	<u>Specification</u>	<u>Mill Cert. Available</u>	<u>Special Test Results</u> Impacts at 400F
Support Skirt	96	SA-533,GRB,CL1	Yes	None
Gusset Plate	98	SA515,GR.70	Yes	None
Base Plate	97	SA515,GR.70	Yes	None

Additional information is included in Attachment 3.

6. Describe the welding procedures and any special welding process requirements that were specified to minimize residual stress, weld and heat affected zone cracking and lamellar tearing of the base metal.

Response:

Welding specifications for the steam generators are included in Attachment 3. Welding of the reactor coolant pump supports is discussed in Section 4.2.5 of the FSAR.

7. Describe all inspections and non-destructive tests that were performed on the supports during their fabrication and installation, as well as any additional inspections that were performed during the life of the facility.

Response:

Welding and Non-Destructive Examination (NDE) were as follows:

<u>Location of Weld</u>	<u>Joint</u>	<u>Procedure</u>	<u>Special Requirements</u>	<u>NDE</u>
Skirt to lower head	WG-57	NSS-3 Submerged Arc	Preheat-Post	MT, UT
		NSS-4 Submerged Arc	Weld Heat	MT, UT
		NSS-9 No weld	Treat	
Gusset to Support Skirt	WG-70	NSS-3 Manual	Preheat-Post	MT
		NSS-4 Metal	Weld Heat	
		NSS-9 Arc	Treat	
Gusset to Base Plate	WG-65	NSS-3 Manual	Preheat-Post	MT
		NSS-4 Metal	Weld Heat	
		NSS-9 Arc	Treat	
Long Seam (Vertical) on Skirt	WG-64	NSS-3 Submerged Arc	Preheat-Post	MT, RT
		NSS-4	Weld Heat	
		NSS-9	Treat	
Circumferential (Transition) Seam on Skirt	WG-61	NSS-3 Submerged Arc	Preheat-Post	MT, RT
		NSS-4	Weld Heat	
		NSS-9	Treat	
Skirt to Base Plate	WG-65	NSS-3		
		Gen. A. Submerged Arc	Preheat-Post Weld Heat Treat	MT
		Gen. B. Manual Metal Arc	Preheat-Post Weld Heat Treat	
		NSS-4 Either Flux Core, Submerged Arc or Manual Metal Arc	Preheat-Post Heat Treat	
		NSS-9 Flux Core	Preheat-Post Heat Treat	MT

NOTE 1.

MT = Magnetic Particle Test
 UT = Ultrasonic Test
 RT = Radiograph Test

ATTACHMENT 2

LIST OF DRAWINGS

0-65D	Steam Generator Lateral Supports and Hanger Steel for Support of Reactor Coolant Pump Constant Support Hangers
0-65G	Reactor Coolant Pump Support Steel
0-65V	Tie Plates for Steam Generator Lateral Supports
0-71A	Foundation for Steam Generators
OM-201-398	Constant Support Hangers for Reactor Coolant Pump Motors
OM-1100-223	Reactor Coolant Pump Design Data
129304E	List of Materials for Steam Generator
149804E	List of Materials for Steam Generator
146454E	List of Materials for Steam Generator
146480E	Assembly and Details of Support Skirt
149830E	Assembly and Details of Support Skirt
129330E	Assembly and Details of Support Skirt