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WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

August 5, 1981

Mr. James P. O'Reilly, Director
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Re: Oconee Nuclear Station
Docket No. 50-269
RO-269/81-11, Supplement 1

Dear Mr. O'Reilly:

My letter of July 24, 1981 provided Reportable Occurrence Report RO-269/81-11 concerning broken core barrel assembly thermal shield bolts. This letter supplements the initial submittal and provides information available to date from laboratory examinations of the fractured bolt samples.

Other utilities with B&W designed NSSS have been advised of results contained herein. Duke will continue to provide supplementary reports as significant actions are completed.

Very truly yours,

William O Parker Jr/ps

William O. Parker, Jr.

RLG/php
Attachment

cc: B&W Regulatory Response Group:

J. J. Mattimoe, SMUD, Chairman
J. H. Taylor, B&W
W. C. Rowles, TECO
D. C. Trimble, AP&L
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Director, Office of Management and Program Analysis

Mr. T. M. Novak, U. S. Nuclear Regulatory Commission

Mr. Bill Lavallee, Nuclear Safety Analysis Center

IE22
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Duke Power Company

Oconee Nuclear Station

Unit 1

Report Number: RO-269/81-11, Supplement 1

Report Date: August 5, 1981

Occurrence Date: July 15, 1981

Facility: Oconee Nuclear Station, Seneca, South Carolina

Identification of Occurrence: Core Barrel Assembly Thermal Shield Bolts Broken

Conditions Prior to Occurrence: Defueled

Supplementary Information:

Additional information has been developed since the July 24, 1981, report which may be useful to the Nuclear Regulatory Commission, specifically in regard to the unaccounted for loose parts (listed on page 2 of the previous report) and the information available to date from laboratory examinations of fractured bolt samples.

With regard to the loose parts, except for one thermal shield bolt head, all thermal shield attachment bolt parts previously identified as missing have been located. The guide block and its attachments are still missing. Due to the completeness of the search to date and due to the size of the block, it is believed not to have been in place when the internals were last installed in 1976. The following table summarizes the current status of components missing, located, and retrieved:

	Initially Missing	Located	Retrieved	Still Missing (8/5/81)
Guide Block	1	0	0	1
Guide Block Dowel	1	0	0	1
Guide Block Bolt	1	0	0	1
Guide Block Bolt Washer	1	0	0	1
Thermal Shield Bolt Heads	5	4	2	1
Thermal Shield Bolt Shanks	4	4	3	0
Thermal Shield Locking Clips	3	3	0	0

The three bolt shanks and two bolt heads retrieved were sent to the Lynchburg Research Center (LRC) of Babcock & Wilcox for examination. One bolt shank and one locking clip were located with remote video equipment in the flow distributor; one bolt head, tentatively identified as one of the missing thermal shield bolt heads, was located near the West upender in the Spent Fuel Pool, and two locking clips were located during the examination of discharged fuel in the Spent Fuel Pool. Efforts are in progress to retrieve these parts.

With regard to the examinations conducted by LRC, the results of the examinations are summarized in the following paragraphs.

A Scanning Electron Microscope (SEM) examination was performed on the best fracture surface, following routing macrophotography work and dimensional and material hardness checks. Metallographic studies were also conducted.

The fracture surface covering most of the bolt cross section was found to be intergranular with grain boundary corrosion attack and branch cracking evident. A smaller central region was found to be transgranular with some fatigue evident. No evidence of shear lips or ductile tearing associated with overload was found. The failure mechanism identified from this examination was determined to be a corrosion fatigue mechanism with low stress levels involved.

Due to the nature of these findings, a review has been initiated in regard to other A-286 (SA 453 GR 660) bolt applications in the reactor internals. Bolts of different size but similar material are used in the Core Barrel to Core Support Shield, Core Barrel to Lower Grid, Upper Thermal Shield Restraint Blocks, and Flow Distributor to Lower Grid Joints. These joints have been carefully scanned with remote video equipment. The joints appear to be tight and no abnormal conditions have been observed. As a precautionary measure, plans are being made to remove one or more bolts from these joints for detailed examination.

While these joints appear to be in the as-installed condition, a review is currently in process to assess the potential consequences of bolt failure. The results of this review will be submitted to the NRC Staff upon completion. The Oconee FSAR, Section 3.2.4, discusses the mechanical design of the reactor internals. As stated there, in the unlikely event that a flange, circumferential weld, or bolted joint might fail, core support lugs welded to the inside of the reactor vessel will limit core drop to ½ inch or less. A ½ inch core drop will not allow the lower end of the CRA rods to disengage from their respective fuel assembly guide tubes, even if the CRAs are in the full-out position. In this rod position, approximately 6½ inches of rod length remain

in the fuel assembly guide tubes. A core drop of ½ inch will not result in a significant reactivity change. The core cannot rotate and bind the drive lines, because rotation of the core support assembly is prevented by the guide lugs.

As indicated in the July 24, 1981 initial report, sensitivity checks on the Loose Parts Monitoring Systems (LPMS) on Oconee Units 2 and 3 have been completed and they have been recalibrated. The operators have been provided additional guidance regarding the importance of the LPMS.

Additional supplemental reports will be provided to advise the status of completion of the corrective actions, and of any new developments that may occur.