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FROM: Duke Power Company Charlotte, N. C. A. C. Thies			DATE OF DOC 1-10-74	DATE REC'D 1-14-74	LTR X	MEMO	RPT	OTHER
TO: A. Giambusso			ORIG 1 signed	CC	OTHER	SENT AEC PDR <u>XXX</u> SENT LOCAL PDR <u>XXX</u>		
CLASS	UNCLASS XXX	PROP INFO	INPUT	NO CYS REC'D 1		DOCKET NO: 50-270		

DESCRIPTION:

Ltr trans the following.....

* Denotes Letter Only

**DO NOT REMOVE
ACKNOWLEDGED**

PLANT NAME: Oconee Unit #2

ENCLOSURES:

REPORT: investigations into the possibility of a loose object in the lower reactor vessel head and information supporting the continued operation

(1 cy rec'd)

FOR ACTION/INFORMATION 1-15-74 GMC

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DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28201

A. C. THIES
SENIOR VICE PRESIDENT
PRODUCTION AND TRANSMISSION

P. O. Box 2178

January 10, 1974

Mr. Angelo Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
Office of Regulation
U. S. Atomic Energy Commission
Washington, D. C. 20545



Re: Oconee Unit 2
Docket No. 50-270

Dear Mr. Giambusso:

Please find attached for your information and review a report concerning the indication of a possible loose object in the lower reactor vessel head of Oconee Unit 2. Extensive investigations and evaluations have been made and are summarized in the attached report. Duke Power Company, the Babcock & Wilcox Company, the on-site Station Review Committee, and the Nuclear Safety Review Committee have reviewed this information and have concluded that operation of Oconee Unit 2 can continue without endangering the health and safety of the public. When Unit 2 is returned to service, the extensive monitoring program also described in the attached report will be implemented.

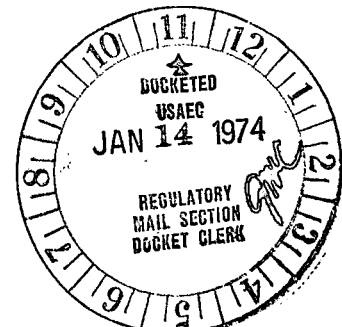
Very truly yours,

A handwritten signature in cursive script, appearing to read "A. C. Thies".

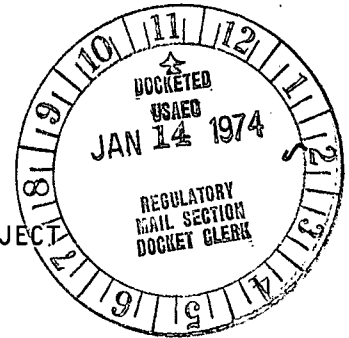
A. C. Thies

ACT:vr
Attachment

cc: Mr. Norman C. Moseley



DUKE POWER COMPANY
OCONEE NUCLEAR STATION - UNIT 2
INFORMATION SUPPORTING THE CONTINUED OPERATION
OF OCONEE UNIT 2 WITH INDICATED PRESENCE OF A LOOSE OBJECT
IN THE LOWER REACTOR VESSEL HEAD



Loose Parts Investigation

An indication of a possible loose object was observed on the loose parts monitoring system when Reactor Coolant Pump 2B1 was started while the reactor coolant system was in a natural circulation mode at approximately 1900 psig and 400°F on January 4, 1974. The indication was of low magnitude, below the alarm setpoint on the loose parts monitoring system. The indication was observed primarily on Channels 3 and 4, monitoring the incore instrument guide tubes near the lower reactor vessel head. Indications, at a lower signal level, were also present on the steam generator upper tube sheet area channels.

Following unit cooldown, the following investigative actions/results were taken to better define and characterize the noise. Observations were made with the LPM output, additional temporary accelerometers, and personnel in the plant using stethoscopes.

1. Various single and dual reactor coolant pump combinations were run. The noise was evident in some single pump runs and during some dual pump runs some observers thought they could hear a faint sound. It was also heard on coastdowns from single and dual pump runs. The noise was present, at least one time, during the operation of each reactor coolant pump.
2. Pieces of hardware, such as bolts, nuts, washers, etc. were used to simulate the noise in the lower vessel head area of Unit 3 which was open and full of water. A ball bearing of about 1/2" to 3/4" diameter most nearly simulated the noises detected in Unit 2.
3. Accelerometers were added to monitor the reactor coolant pump area for possible noise source in the motor anti-rotation device or other pump-related sources. Time delay analysis between the various sensors showed the noise was not coming from the reactor coolant pump area but from somewhere equi-distant from the four pumps.
4. Unit 1 reactor coolant pumps were run to determine if a similar noise could be detected. None were.
5. Time delay analysis data of the signals from the various loose parts monitoring system channels showed the following time sequence for pickup of the noise signal: First, lower vessel head area; second, upper vessel head area; and last, the steam generator upper tube sheet area. There was no evidence that the object moved out of the lower vessel head area.

6. A Unit 2 reactor coolant pump was run for a few seconds to induce momentary motion of the suspected loose object. The noise sounded similar to a rolling/sliding object on the lower vessel head during the coastdown (about like a ball coming to rest on a roulette wheel).
7. Baseline data tapes taken on the loose parts monitoring system during earlier periods of both Unit 1 and Unit 2 operation did not indicate this noise.
8. The level of noise is significantly less than the cold water flow noise and is indicative of low energy contacts. The noise to background ratio is higher during the flow coastdown than during the continuous pump operation.
9. Other sources of noise in the plant were investigated. Indication of a decay heat system check valve movement and possible secondary plant-related noises were detected in addition to noises occurring in the lower vessel head area.
10. Sampled steam generator secondary sides for boron and radio-isotopes. Nothing abnormal was detected.

Based upon the above investigations/results, the following conclusions have been reached:

1. Based on Ocone 3 diagnostic tests, we suspect the object may be metallic and of a mass consistent with a 5/8" diameter sphere.
2. The data indicate high probability for the object being in the lower vessel head area.
3. The object tends to become fixed in location as the reactor coolant flow increases to that of two (or more) reactor coolant pumps.

The following steps have been taken to determine the source of the loose object:

1. Valves have been radiographed in the high pressure injection and low pressure injection systems to ensure that valve stems, plugs, and guides are still in place. No useful information was obtained due to the thickness of the valve bodies.
2. Valves have been cycled in the high pressure injection and low pressure injection systems to verify the flow can be stopped and that valves are operating properly. This work will be completed before unit startup.
3. It has been verified that the high pressure injection thermal sleeves are in place.
4. The HPI flow restriction orifices will be dismantled and inspected prior to unit startup.
5. All control rod drive mechanisms were exercised and functioned normally.

Safety Evaluation

The objective of this statement is to address what is considered to be the worst possible safety-related situation arising from the postulated loose part. The worst case assumption, which is highly improbable in view of the diagnostic testing done to date, is considered to be the lodging of a piece of the object within a fuel assembly. It could then be assumed that local fuel clad failure occurs due to either the departure from nucleate boiling or mechanical wear (fretting). As a result of this, reactor coolant activity would increase; hence, activity would be a satisfactory parameter for judging the status of fuel clad integrity during operation. Only localized fuel damage is postulated; therefore, the core would remain in a coolable geometry. Coolant activity will be monitored and the plant promptly shut down for further investigation if a preset acceptance criteria is exceeded. Consequently, Duke Power Company considers that the continued operation of Oconee 2 does not represent undue risk to the health and safety of the public. Continued operation has been reviewed by the on-site Station Review Committee, the Nuclear Safety Review Committee, the Babcock & Wilcox Company, Oconee Nuclear Station management, Duke Steam Production Department General Office management and Duke senior management. All concur in this evaluation and conclusion.

Monitoring Programs

Conditional to the continued operation of Oconee 2, the following monitoring and surveillance programs will be implemented upon resumption of operation. These programs will be discontinued if the particle is removed or if evaluation shows that they are no longer necessary.

A. LOOSE PARTS MONITOR:

1. Sensors will be positioned to optimize both total nuclear steam supply system and reactor vessel lower head surveillance.
2. Personnel will listen continuously to the loose parts monitor during and immediately after all pump or major temperature changes.
3. Personnel will listen to the loose parts monitor periodically during steady-state operations and for some designated period of time after an alarm on the loose parts monitor. (Sometimes the telephone horn vibration exceeds the alarm point.) The length of this listening period will be specified in a station procedure.
4. Capability to analyze transport time differences between sensors will be on-call. Necessary personnel will be trained in the use of the loose parts monitor and will be familiar with noise tapes.

B. CORE POWER DISTRIBUTION:

1. A core power distribution will be obtained at 40 percent power (non-equilibrium xenon) with plant conditions similar to those which existed when the core power distribution was taken prior to shutdown. These results will be compared, and any major differences explained before operation at higher power.

2. The core power distribution test program will be continued at 75 percent power with extra attention to local effects.

C. NEUTRON NOISE:

1. At 40 percent power, a neutron noise signature will be obtained at plant conditions comparable to those which existed when an earlier signature was taken at 40 percent. The power spectral densities of these two signatures will be compared, and any differences will be evaluated prior to operation at higher power. Cross correlations from neutron detectors will be compared within seven days.
2. At 75 percent power, a signature to the one obtained at 40 percent power will be taken and cross correlations completed prior to operation above 80 percent power.

D. REACTOR COOLANT RADIOACTIVITY:

Reactor coolant radioactivity will be closely monitored. Quantitative limits will be established, and if the reactor coolant activity exceeds these limits, the reactor will be shutdown and the cause of the increase in activity determined.