FROM:
Duke Power Company
Charlotte, North Carolina 28201
A. C. Thies

DATE OF DOCUMENT: 4-4-72
DATE RECEIVED: 4-7-72
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TO:
Dr. Morris

ORIG.: 3 signed & 37 conf'd
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NO ACTION NECESSARY ☐
CONCURRENCE ☐
COMMENT ☐
DATE ANSWERED:
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DESCRIPTION: (Must Be Unclassified)
Ltr reporting failure on 3-11-72 of several reactor internal components during Hot Functional Testing of Oconee Unit # 1..trans the following:

ENCLOSURES:
Reactor Coolant System Incident Report, dtd 4-4-72.

(40 cys rec'd)

REMARKS:
16 cys giben to ACRS during meeting on 4-7-72 by Schwencer.

REFERRED TO	DATE	RECEIVED BY	DATE
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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

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Regulatory File Cy.

April 4, 1972

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Regulatory
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Dr. Peter A. Morris, Director
Division of Reactor Licensing
Atomic Energy Commission
Washington, D. C. 20545

Reference: Oconee Nuclear Station
Unit 1
Docket No. 50-269

Dear Dr. Morris:

Duke Power Company herewith submits forty (40) copies of "Reactor Coolant System Incident Report" in response to requests by your staff. This report identifies the sequence of events and extent of damage associated with loose parts which resulted from the failure of several reactor internal components during Hot Functional Testing of Oconee Nuclear Station Unit 1.

An investigation is now underway to determine the cause of the failures and establish the bases for appropriate redesign and repairs. Both Babcock & Wilcox and Duke Power Company are committing their full resources to this investigation and will keep your staff fully informed of the progress and plans.

Very truly yours,

ACThies

A. C. Thies

ACT:vr

Enclosures

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DUKE POWER COMPANY

OCONEE NUCLEAR STATION

UNIT 1

REACTOR COOLANT SYSTEM INCIDENT REPORT

DOCKET NO. 50-269

APRIL 4, 1972

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DUKE POWER COMPANY
OCONEE NUCLEAR STATION
UNIT NUMBER 1
REACTOR COOLANT SYSTEM INCIDENT REPORT

I. Summary

At the conclusion of the first phase of the hot functional testing program of Oconee Station Unit 1 on March 11, 1972, an inspection of the reactor coolant system revealed the failure of several reactor internal components. The loose parts resulting from these failures caused extensive damage to the tube ends and to the tube sheet welds in the "A" steam generator upper head. The "B" steam generator upper head tube ends and welds experienced only minor damage. It has been determined that these parts are principally the 3/4" diameter incore instrument nozzles which penetrate the bottom of the reactor vessel and allow insertion of flux instrumentation into the reactor core. Twenty-one incore instrument nozzles broke off just above the weld on the inner surface of the reactor vessel. The cause of these failures and the schedule for repair has not yet been determined. This report presents a summary of the pertinent events related to these failures and describes the damage observed in the reactor coolant system during the subsequent inspection.

II. Sequence of Events

This section of the report presents a chronological sequence of events which are pertinent to the observed reactor coolant system damage, as derived from shiftlogs and discussions with test and operating personnel. In addition, a plot, Figure 1, is presented of the temperature and pressure during the first phase of the hot functional test from February 21 through March 10, 1972.

1. On March 3, 1972, a noise was heard on the "A" loop side of the reactor coolant system at a temperature of approximately 350°F. No noise was heard on the "B" loop side. The noise stopped when both "A" loop reactor coolant pumps were secured. Also on March 3, 1972, the signal from accelerometer SN104 located in the thermocouple guide tube began to show 60 Hz noise, indicating an open lead. B&W project management personnel were notified and arrangements were made for B&W engineering personnel to visit the station the next day. why not stop

   [illegible] top of S/G

2. On March 4, 1972, heat up from 500°F to 532°F was started. The noise level was approximately the same as observed on March 3. Of 60 temporary thermocouples installed in the once-through steam generator "B" (OTSG "B"), two now showed a slight divergence reading. Representatives of B&W engineering arrived at the site to monitor the noise levels in OTSG "A". Opinions varied among the observers as to whether the noise was louder at the top or bottom of the steam generator, but were consistent in locating the source of the noise within the OTSG "A".

3. On March 5, 1972, the noise level in OTSG "A" seemed lower.

4. On March 6 engineering personnel continued to assess the source and character of the noise, and arrangements were made to bring noise analysis equipment to the site. Also on March 5 and 6 reactor coolant system leakage measurements were being made; the results of these calculations indicated no unusual leakage.

5. Investigations on March 7, 1972, revealed that 23 of the 60 temporary thermocouples in OTSG "B" had failed. Personnel from B&W Alliance Research Center arrived to record and analyze the noise for various reactor coolant pump combinations.

6. On March 8, 9, and 10, the noise levels in OTSG "A" were essentially the same as observed on March 5 and 6. No specific conclusion could be reached regarding the source of the noise. OTSG "B" was checked frequently from March 3 through 10 and no noise was heard.

7. On March 10, 1972, the first phase of hot functional testing had been completed and the reactor coolant system was cooled down to 250°F and pressure reduced approximately 400 psig. The reactor coolant system was depressurized and drained on March 11 and 12. On March 13, 1972, the upper manway on OTSG "A" was opened and metallic objects of various shapes were seen on the tube sheet. The upper manway on OTSG "B" was also opened and inpsection revealed approximately one-half of the temporary thermocouple conduit (which is part of the first-of-a-kind instrumentation for OTSG testing) was dislocated and four pieces of metallic tubular material were seen on top of the tube sheet.

8. On March 14, 1972, the lower manways on both steam generators were opened; small flakes of metallic material were noted on the lower head surfaces. The decision was then made to remove the reactor vessel head.

9. On March 17, 1972, the reactor vessel head was removed. Metal flakes were noted on the top of the plenum assembly. Two 1/2" diameter thermocouple guide tubes were observed to be missing from the upper plenum assembly (one contained accelerometer SN104 and the other was empty). The upper plenum and internals were subsequently removed on March 17 and 18 and a number of incore instrument nozzles and guide tubes were noted to be broken.

III. Extent of the Damage

Inspection of the reactor coolant system revealed the following damage as of March 30, 1972: (Figure 2 illustrates the location of the damage for numbers 3, 4, 5, 7, 8, and 9 below)

1. In OTSG "A" extensive impact damage to the tube sheet welds was observed on the upper tube sheet. This damage apparently was caused by repeated impact of the metallic objects (principally pieces of the

3/4" diameter incore instrument nozzles) which were found in the upper plenum of the steam generator. The inside surface of the steam generator head also showed the effects of impact.

2. In OTSG "B" about half of the tube ends showed indication of being hit. Approximately 10 percent of these will require minor weld repair. The metal objects found in the upper plenum of this steam generator were trapped in the temporary instrumentation, apparently the reason for the limited extent of damage to the tube ends and tube to tube sheet welds. There are some impact marks on the inside of the OTSG "B". The temporary thermocouple instrumentation was partially destroyed.

3. Twenty-one 3/4" diameter incore instrument nozzles were broken off. Fourteen additional nozzles were cracked in the region above the weld. Seventeen nozzles showed no cracks.

4. Four incore instrument guide tube extensions were broken off below the lower flow distributor and their four spider assemblies were dislocated. One of these was also broken above the distributor. Four additional guide tubes were cracked in the region of the weld below the flow distributor. Forty-four tubes showed no cracks.

5. There are nicks and scratches on the lower flow distributor.

6. Nicks and impact marks were observed on the flow guide vanes and the bottom of the reactor vessel.

7. At the mating surfaces between the thermal shield and the lower grid assembly, some metal upset at the edges was observed. The retention weld on all eight dowels at the lower edge of the thermal shield were broken and one of the dowels had backed out approximately 3/4".

8. Two of six installed 1/2" diameter thermocouple guide tubes were broken off of the upper plenum assembly.

9. There are minor scratches on the face seal between the reactor vessel 36" outlet nozzle and the core support shield.

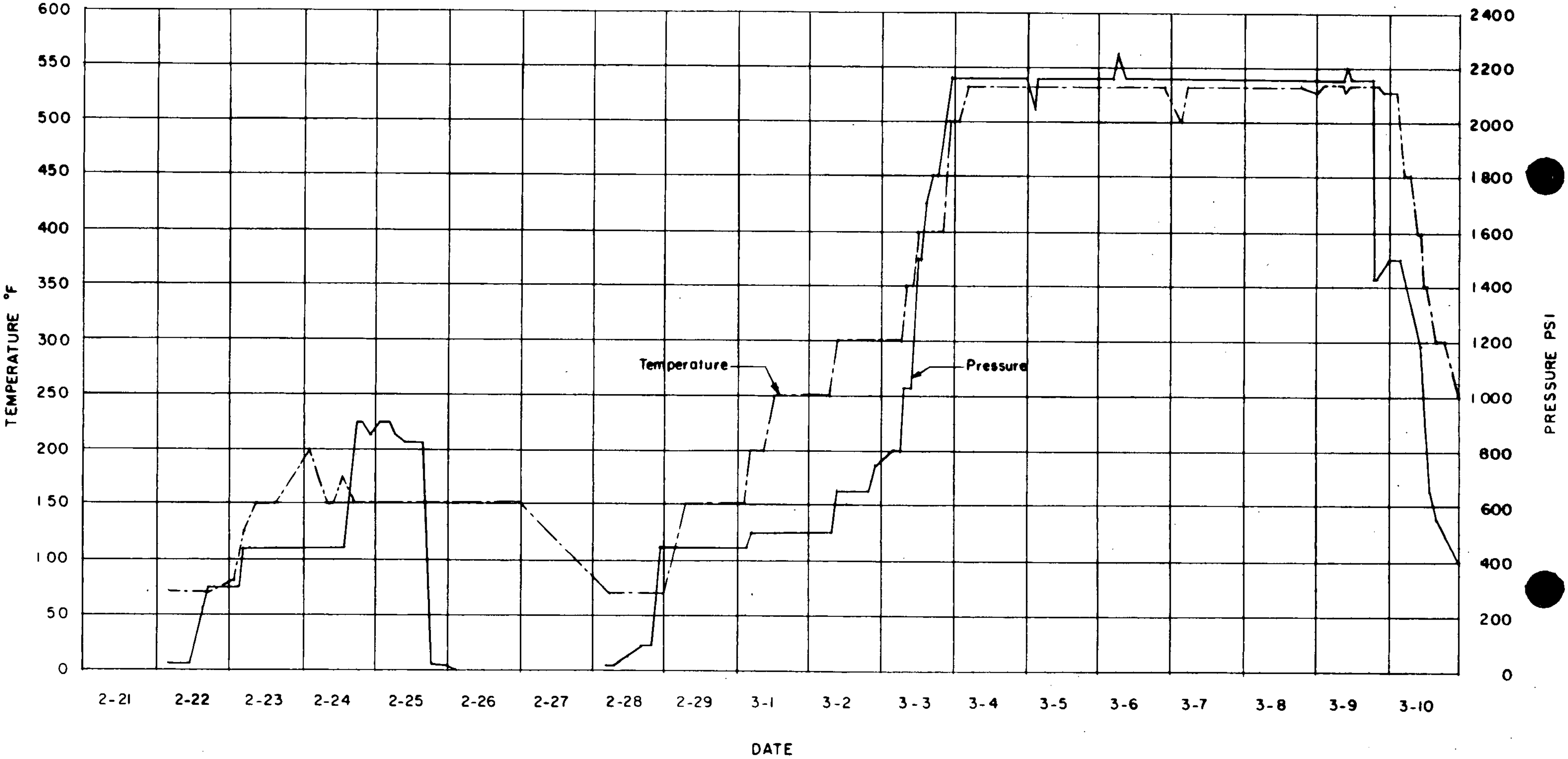
10. Minor scratch marks were noted in both the 36" and the 28" reactor coolant piping.

11. Minor scratches were observed on the reactor coolant pump impellers.

IV. Status of Recovery Operations

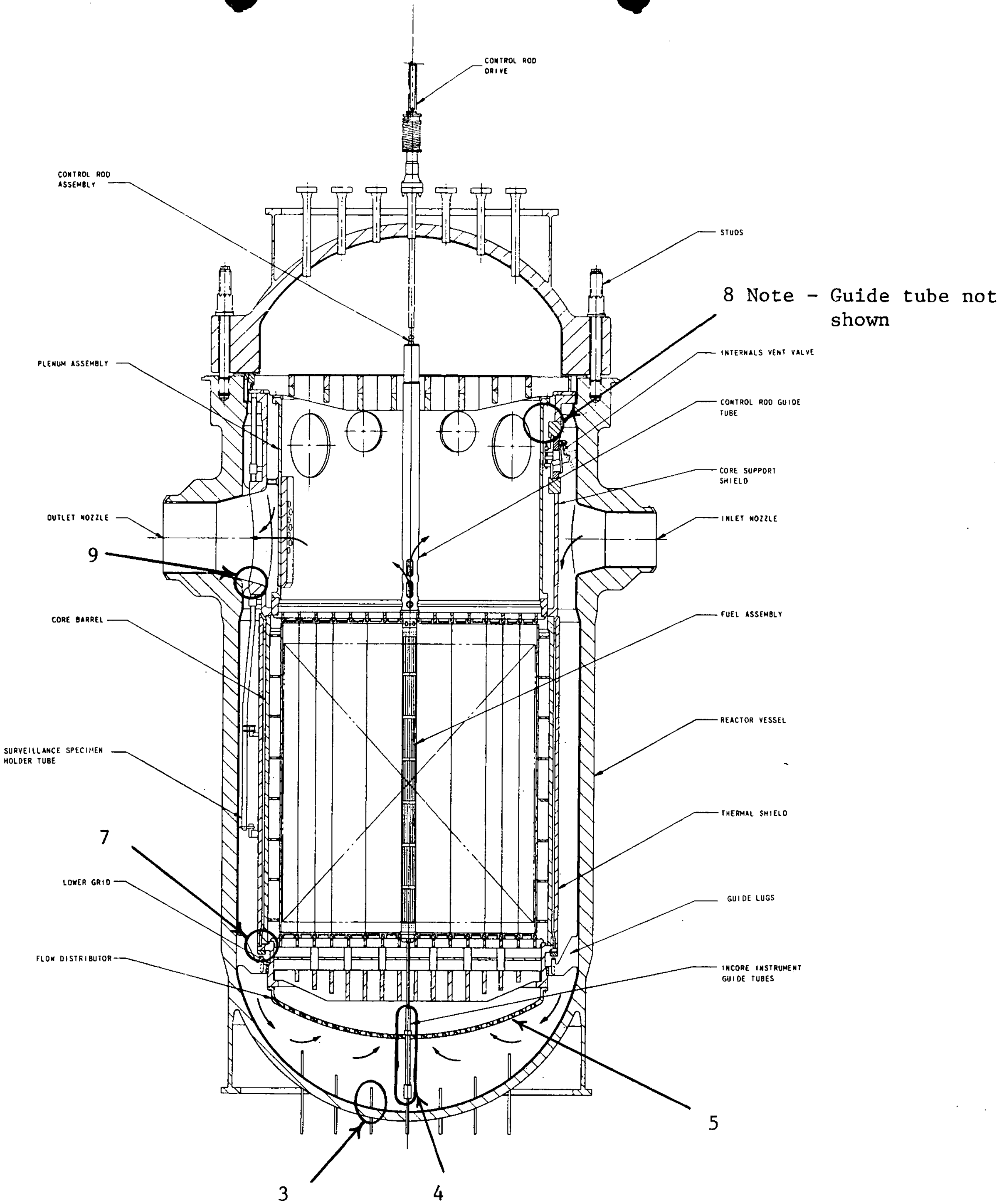
Repairs are underway on the OTSG "B" using approved factory repair procedures while on OTSG "A" investigation of damage and development of repair procedures continues.

An orderly investigation will determine the cause of the failures in the reactor vessel and will establish the basis for appropriate re-design and repairs. Approved procedures will be used during the investigations and repair work.



REACTOR COOLANT SYSTEM
PRESURE TEMPERATURE HISTORY
(2-21-72 to 3-10-72)

FIGURE 1



REACTOR VESSEL AND INTERNALS - GENERAL ARRANGEMENT

OCONEE NUCLEAR STATION

Figure 2