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RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-012-00: on 871203, discovered exam frquency of reactor coolant pump flywheels exceeded requirement of Tech Spec 4.2.3. Caused by QA deficieny. Inservice insp plan revised. W/880205 ltr.

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit 1	0 5 0 0 0 2 6 9	1 OF 0 6

TITLE (4) Technical Specification Violation Due To An Exceeded Inservice Inspection Interval Resulting From A Quality Assurance Deficiency

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
1 2	0 3	8 7	8 7	— 0 1 2	— 0 0	0 2	0 5	8 8	Oconee Unit 2	0 5 0 0 0 2 7 0
									Oconee Unit 3	0 5 0 0 0 2 8 7

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
N		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
0 0 0		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Philip J. North, Licensing	7 0 4 3 7 3 - 7 4 5 6

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On December 3, 1987 during a procedure implementation review it was discovered that the examination frequency of the Reactor Coolant Pump (RCP) flywheels had exceeded the requirements of Technical Specification 4.2.3. This specification states the frequency of inspection for the RCP flywheels to be approximately three years. Upon review of this incident, it was discovered that the required frequency was violated four times involving all three units. During each inspection, the unit being inspected was shutdown for refueling.

The root cause of this incident was determined to be a Quality Assurance Deficiency because QA-Operations interpreted that the required three year inspection period allowed a time period of 3 to 5 years between inspections. This exceeded the interval intended by Specification 4.2.3 and ASME Section XI.

The immediate corrective action was to report the violation to QA-Operations. Subsequent corrective actions involved an evaluation of past inspection results to ensure the RCP flywheel had been inspected within the requirements established by Specification 4.2.3. Planned corrective actions include preparation of a Technical Specification interpretation and revision to Inservice Inspection plans.

IE12

☆U.S.GPO:1984-0-454-481/18759

Background:

The Reactor Coolant Pump (RCP) flywheel is a large metal plate that is keyed to the pump shaft. The momentum produced by the flywheel extends the coastdown time of the RCP following the trip of that pump. The coastdown time is 1 to 2 minutes. Extending the coastdown time helps prevent exceeding core thermal limits if an RCP were to trip while at 100% power. While at power, it is possible for the RCP flywheel to fail and produce high-energy missiles. The most credible failure of the flywheel comes from defects within the flywheel. This issue was addressed in NRC Regulatory Guide 1.14. This Regulatory Guide established a program to inspect the RCP flywheel on an approximately 3 year interval. This inspection interval was outlined in Technical Specification 4.2 and was an original Technical Specification.

Sequence of Events:

August 1975	o	Regulatory Guide 1.14 was issued to Licensed Nuclear Power Plants by the NRC.
January 1, 1976	o	The actual inspection interval was 3 years + 1 year to coincide with planned outages.
	o	QA-Operations misinterpreted the inspection interval for RCP flywheel inspection to be 3 to 5 years between inspections.
July, 1981	o	Oconee Unit 1 RCP flywheel inspection was performed.
	o	62 months had elapsed since the last Unit 1 inspection.
	o	This was the first violation of Specification 4.2.3.
Feb./March, 1986	o	Oconee Unit 1 RCP flywheel inspection was performed.
	o	55 months had elapsed since the last Unit 1 inspection.
	o	This was the second violation of Specification 4.2.3.
Sept./Oct., 1986	o	Oconee Unit 2 RCP flywheel inspection was performed.
	o	53 months had elapsed since the last Unit 2 inspection.
	o	This was the third violation of Specification 4.2.3.
February, 1987	o	Oconee Unit 3 RCP flywheel inspection was performed.
	o	57 months had elapsed since the last Unit 3 inspection.
	o	This was the fourth violation of Specification 4.2.3.
December 3, 1987	o	A QA Technical Services Representative discovered the Technical Specification violation while performing a procedure implementation review.
	o	The QA Technical Services Representative informed QA-Operations of the Technical Specification violation.
December 3-7	o	QA-Operations researched the past inspection intervals to determine how many violations occurred.
	o	QA-Operations verified the last inspection on each unit was within the Technical Specification required schedule.
	o	QA-Operations re-verified that the last inspection on each unit was valid.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0 5 0 0 0 2 6 9	8 7	— 0 1 2	— 0 0	0 3 OF 0 6

TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

Description of Occurrence:

In August, 1975 the NRC issued Regulatory (Reg.) Guide 1.14 to the licensees of light-water-cooled power reactors. This Guide outlined an inspection program for the RCP flywheels in order to minimize the potential for their failures. Reg. Guide 1.14 stated that the inservice inspection interval for the flywheels should be at approximately 3-year intervals, during the refueling or maintenance shutdown outages coinciding with the inservice inspection schedule as required by Section XI of the ASME Code. No guidance was given by the NRC as to which ASME class that the flywheels should be assigned and therefore it was up to Duke Power to interpret the inspection schedule. The issue of an RCP flywheel inspection program was outlined in Oconee's original Technical Specifications and was a reflection of the program discussed above (i.e., approximately 3-year intervals).

The original Technical Specification for RCP Flywheel inspection was incorporated into Quality Assurance (QA)-Operations 10-year Inservice Inspection Plan. This interpretation was made by one QA-Operations individual. QA-Operations was aware of the Inservice Inspection Program established in Section XI of the ASME code, however they established their inspection schedule based on the statement "approximately 3-year intervals" included in Technical Specification 4.2. This led to a misinterpretation of the flywheel inspection schedule by QA-Operations because their interpretation of Specification 4.2 inspection period was 3 to 5 years.

Duke Power Company utilizes Inspection Program B in Section XI of the ASME code. This inspection program breaks the life of the plant into four equal inspection intervals of 10 years each. Each inspection interval is subdivided into three parts called inspection periods. The inspection periods are 3, 4, and 3 years long. Therefore, during the first ten years of plant life, there are three inspections. They are at the 3rd, 7th and 10th calendar years of plant service. The 2nd, 3rd, and 4th inspection intervals are similar to the first. The inspection periods may be increased by 1 year to enable an inspection to coincide with a plant outage.

Since QA-Operation's inspection plan did not fully conform to the guidelines established in Technical Specification 4.2.3, some of the inspection intervals scheduled were in violation of Technical Specification 4.2.3.

Over the 12 year period between January 1, 1976 and February 28, 1987, there were eleven RCP flywheel inspections. During each inspection, all 4 pumps on each of the respective units were inspected. Of the 11 inspections, 4 were in violation of Technical Specification 4.2, because they exceeded the inspection period established in Specification 4.2. The above violations are based on ASME Section Section XI Paragraph IWB which provides for inspection intervals to be 3 years plus 1 year to allow the inspection to coincide with planned outages.

On December 3, 1987 a QA Tech Services representative discovered the violations while he was performing a procedure implementation review. This review had nothing to do with Oconee's RCP flywheel inspection program. His discovery of this incident was above what was expected of him. His immediate actions were to

contact QA-Operations and inform them of the violation. Between December 3 and December 7, 1987, QA-Operations researched past inspection intervals to determine how many violations occurred. In addition, QA-Operations reviewed their records and ensured the last inspections of the RCP flywheels at Oconee were within the requirements of Specification 4.2.3.

Cause of Occurrence:

The root cause of this incident was determined to be a Quality Assurance Deficiency due to QA-Operations' misinterpretation of Specification 4.2. Their interpretation of the inspection period allowed a time period of 3 to 5 years, which did not conform to the standards established by Technical Specification 4.2 or ASME Section XI Paragraph IWB.

The reason for their misinterpretation was that they interpreted "approximately 3-year intervals" in Specification 4.2 to coincide with other surveillance programs already established. In this instance, they did not recognize the fact that they were required to follow different guidelines. An interpretation of "approximately 3 years" was requested of a NRC Region II Inspector. He referred to ASME Code, Section XI, Part IWB. This interpretation gave guidance for the inspection interval to be 3 years + 1 year to allow the inspection to coincide with planned outages.

Another reason for this misinterpretation was because the Operations' QA manual required only one person to interpret and implement a change or addition to their Inservice Inspection Plan. Therefore, only one person was involved with the interpretation and scheduling of the frequency of RCP flywheel inspections. There was no review of the Inspection Plan by another individual. This is considered to be a QA deficiency because a program had not been established to prevent a single interpretation/implementation of a change to the Inservice Inspection Plan.

A review of incidents over the past three years revealed two incidents where surveillance intervals were exceeded. However, both of the incidents were caused by personnel errors. Since this incident was caused by a Quality Assurance Deficiency, it is considered nonrecurring but similar.

There was no equipment failure, thus this incident is not NPRDS reportable. There was no release of radioactive materials, radiation exposure, of personnel injuries as a result of this incident.

Corrective Actions:

The immediate corrective action was for the QA-Tech. Services representative to inform QA-Operations of the Technical Specification violation.

Subsequent corrective actions were for:

- o QA-Operations to verify that the most recent inspection of all three Oconee Units' RCP flywheels were within the time schedule of Section XI of the ASME code;

- o QA-Operations to verify the results of the most recent RCP flywheels inspections on all three units;

- o QA-Operations to review their records to find out how many times Specification 4.2.3 was violated;

- o QA-Operations to implement, in their QA Inspection Manual a program to ensure no fewer than three individuals review a change/addition to their Inservice Inspection Plan. This was implemented in April, 1981.

Planned corrective actions are for:

- o The Compliance Section to draft a Technical Specification interpretation for Specification 4.2.3 that will reflect ASME Section XI Paragraph IWB.

- o QA-Operations to revise all three Oconee Inservice Inspection plans to ensure the RCP flywheels are inspected every 3 years + one year to coincide with planned outages.

Analysis of Occurrence:

The commitment to inspect the RCP flywheels was enhanced from recommendations of NRC Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity". RCP flywheel integrity needs to be maintained for two reasons: 1) to ensure that the RCP remains operable for the sake of primary coolant flow, and 2) to ensure that missiles cannot be generated from flywheel failure. RCP inoperability for primary coolant flow concerns is fully analyzed in FSAR Chapter 15.6, "Loss of Coolant Flow Accident" and shows that no fuel melting is predicted. However, the consequences of flywheel-generated missiles are not analyzed in the FSAR as stated in Chapter 3.5, "Missile Protection":

> "Protection is not provided for certain types of missiles for which postulated accidents are considered incredible because of the material characteristics, inspections, quality control during fabrication and conservative design as applied to the particular component. Included in this category are missiles caused by massive, rapid failure of the reactor vessel, steam generator, pressurizer, main coolant pump casings and drives."

The position of the FSAR is consistent with that of Regulatory Guide 1.14 which states, "If the flywheel . . . is conservatively designed and made from suitable materials with closely controlled quality, if adequate design review of new configurations is provided, and if adequate inservice inspection is provided, the probability of a flywheel failure is sufficiently small that the consequences of failure need not be protected against."

FSAR Chapter 5.4.4, "Reactor Coolant Pump Motors," shows that the above requirements of design conservatism and material/fabrication quality has been satisfied. The largest amount of confidence in the flywheels is obtained from

the design conservatism. The flywheel design is based on design speed of 125 percent. Also, the flywheels are designed for 10,000 starts while the Duke Power specification is for no more than 500 starts in forty years. Calculations based on the flywheel material show that 400,000 starts are needed before crack initiation (a factor of 800 over the Duke Power specification).

The flywheel inspections occurred at 62 and 55 months from the previous inspections for Unit 1, at 53 months for Unit 2, and at 57 months for Unit 3. These intervals exceeded or failed to meet the Technical Specification 4.2.3 inspection requirement by 29% and 15% for Unit 1, 10% for Unit 2, and 19% for Unit 3. The safety margins in the flywheel design and fabrication were adequate to compensate for this increased time between inspections. Furthermore, subsequent inspections showed that the integrity of the flywheels had not degraded during the time periods between inspections. This fact along with the large margin of conservatism in the flywheel design proves that safety was not compromised and that the health and safety of the public were not affected by this incident.

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VICE PRESIDENT
NUCLEAR PRODUCTION

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February 5, 1988

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269
LER 269/87-12

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report (LER) 269/87-12 concerning a violation of Technical Specifications due to exceeded reactor coolant pump flywheel surveillance intervals. By letter dated January 7, 1988 Duke informed the NRC of the delay in submitting this report.

This report is submitted in accordance with §50.73(a)(2)(i)(B). This event is considered to be of no significant with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

PJN/1332/sbn

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