CONDITION REPORT

RD 8342-1

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EVENT DATE	EVENT TIME	DISCOVERY DATE	DISCOVERY TIME	REFERENCE DOCUMENTS/ASSET NUMBER
		4/6/2000	0330	

CONDITION DESCRIPTION

Inspection of the Reactor Head indicated accummulation of boron in the area of the CRD nozzle penetrations through the head. Borlon accummulation was also discovered on the top of the thermal insulation under the CRD flanges Boron accummulated on the top of the thermal insulation resulted from the CRD leakage. The CRD leakage issues are discussed in CR 2000-0782

☒ CONTINUED

NAME (Print)	SIGNATURE	DATE	ORGANIZATION	TELEPHONE NO.	MAIL LOCATION
Andrew Siemaszko	Andrew Siemaszko	04/17/2000	SYME	7341	1056

SUPERVISOR

PLANT OPERATIONS REVIEW ☒ YES ☐ NO

COMMENTS

This CR should be sent to SYME for resolution.

This CR will address the effect of the boron on the head,

CR 2000-0782 will address the hardware issue of leaking flanges.

RECOMMENDED CATEGORY

ROUTINE

☐ CONTINUED

NAME (Print)	SIGNATURE	DATE	ORGANIZATION	TELEPHONE NO.	MAIL LOCATION
G R McIntyre		4-18-00	SYME	8165	1056

REPORTABILITY ☐ 1 HR ☐ 4 HR ☐ 24 HR ☒ N/A

OPERABILITY ☐ YES ☐ NO ☒ N/A

IMMEDIATE ACTIONS TAKEN OR NEEDED / COMMENTS

AS NOTED ABOVE

cc: Initiator
CR Files
~~Nuclear Records Management~~
QIP

☐ CONTINUED

NAME (Print)	SIGNATURE	DATE	TIME
PLOEGER R	T. Ploeger	4/18/00	0353

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[2354]

CONDITION REPORT
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NO. 2000-1037

[redacted]

OWNER	CATEGORY	DUE DATE	OPERATING EXPERIENCE REPORT
SYME	ROUTINE	7/17/00	☐ EVALUATE ☐ INITIATE

☐ CATPR — CAUSE DETERMINATION: ☒ APPARENT ☐ ROOT CAUSE ☐ MULTI DISC ROOT CAUSE — ☐ ERB

☐ EXPERIENCE REVIEW ☐ EXTENT OF CONDITION ☐ POTENTIAL MRFF ☐ OTHER REVIEW REQUIRED

MRC COMMENTS

MODE 4 RESTRAINT - Complete all actions necessary to restore equipment to allow the Mode change. When all actions are complete, document on a Cause/Action Sheet (ED8342B) and provide a copy of the CR to Quality Programs.

Kond

☒ CONTINUED

SUPERVISOR ASSIGNED DUE DATE:

10 CFR PART 21? ☒ NO ☐ YES	IF YES, DATE	SYSTEM CAPABLE OF PERFORMING SPECIFIED FUNCTION? ☐ YES ☐ NO ☐ N/A	
ANI REVIEW REQUIRED? ☒ NO ☐ YES IF YES, ANI SIGNATURE REQUIRED		SIGNATURE	DATE
PREPARER (Print) ANDREW SIEMASZKO		SIGNATURE Andrew Siemaszko	DATE 5/1/2000
SUPERVISOR APPROVAL (Print) Glenn McIntyre		SIGNATURE	DATE 5-1-00
MANAGER APPROVAL (Print) ☐ N/A		SIGNATURE	DATE
DIRECTOR APPROVAL (Print) ☐ N/A		SIGNATURE	DATE
VICE PRESIDENT APPROVAL (Print) ☐ N/A		SIGNATURE	DATE
SRB APPROVAL (Print) ☐ OE REQUIRED ☐ N/A		SIGNATURE	DATE
ERB APPROVAL (Print) ☐ N/A		SIGNATURE	DATE

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See attached response.

☐ Continued

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Problem statement.

Large deposits of boron have accumulated on the top of the insulation and on the Reactor Vessel Head.

Event description.

Initial Reactor Vessel Head inspection conducted on 4/5/2000 revealed an accumulation of boron on the Southeast Reactor head flange between the head and the studs. Boron deposits were "lava like" and originate from the "mouse holes" and CRD flanges.

Framatome completed the CRD Video Inspection at 1400 on 4/6/2000. Ed Chimahusky and Andrew Siemaszko were present during the inspection. The inspection is documented on the VHS video cartridge. James R. Harris from Framatome Technologies, Ed Chimahusky, and Andrew Siemaszko examined the results of the inspection.

Five leaking Control Rod Drives were identified at locations: F10, D10, C11, F8, and G9. Main source of leakage can be associated with F10 drive. Positive evidence exists that drives F8, D10 and C11 have limited gasket leakage. This condition can propagate at any time and therefore these drives are considered as leaking. There are no boron deposits on the vertical faces of the flange of G9 drive. The bottom of the flange of G9 drive is inaccessible for inspection due to the boron buildup on the reactor head insulation, not allowing full camera insertion. Since the boron is evident only under the flange and not on the vertical surfaces, there is a high probability that G9 is a leaking CRD.

Based on the available information, System Engineering recommended replacement of gaskets or repairs for Control Rod Drives located at F10, D10, C11, F8, and G9 as necessary.

Other supporting information.

Review of industry experience indicates that this type of CRD leakage has been identified numerous times in the nuclear industry. Since the leakage is unwanted, the most typical approach to resolve the problem is to replace gaskets and machine flange faces as required.

CR 2000-0994 was issued to evaluate the F10 CRD flange condition.

Video inspection of the F10 flange indicated presence of small pitting on the outer gasket area. The pitting was located on the outer race of the outer gasket. There was no evidence of erosion noted. The remaining surface of the flange was smooth and no evidence of leakage was noted. Due to the external location of the pitting the possibility of gasket leaks was eliminated. Ron Pillow recommended that the condition of the flange is acceptable for gasket replacement without any need of flange machining. This Framatome Technologies evaluation was supported by the Davis Besse System Engineering recommendation not to machine the F10 flange surface.

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The apparent cause of the pitting is associated with the manufacturing process and/or the flange casting process. Reasonable assurance exists that the F10 flange was pitted during initial installation.

Conclusions.

System Engineering and Framatome Technologies recommend that the F10 flange be accepted for use in the condition "as found". Other then normally performed lapping process no additional machining is recommended.

CR 2000-0995 was issued to evaluate the D10 CRD flange condition.

Video inspection of the D10 flange indicated presence of large pitting on the inner and outer gasket areas. The pitting was located mainly on the outer race of the inner gasket. The outer gasket area indicated leakage path and flange material loss. There was evidence of erosion noted. Ron Pillow recommended that the condition of the flange is unacceptable for gasket replacement and recommended the D10 flange machining. This Framatome Technologies evaluation was supported by the Davis Besse System Engineering recommendation to machine the D10 flange surface.

The apparent cause of the pitting is associated with the random loss of the CRD flange bolt(s) tension. This resulted with a small steam leak that propagated with time. This type of leak is well recognized and common in the nuclear industry. It is also difficult to predict. Since the cost of preventative actions to verify the elongation of the CRD flange studs are extremely high these actions are typically not recommended.

Conclusions.

System Engineering and Framatome Technologies recommend that the D10 flange be machined and new gasket installed.

The D10 flange has been machined and new gasket installed.

Nuclear Regulatory Commission (NRC) issued Generic Letter 97-01 to holders of operating licenses for pressurized water reactors (PWR's). The letter requires licensee to maintain a program for ensuring a timely inspection of the control rod drive mechanism (CRDM) and other vessel closure head penetrations. The program is required due to degradation of the CRDM nozzles caused by Primary Water Stress Corrosion Cracking process. In order to perform required inspections the nozzles as well as the penetrations must be free of boron deposits. Once the head is free from the boron, new boric acid deposits may be easily noted and remedial actions taken.

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Apparent cause.
The apparent cause is CRD flange leakage as identified in CR 2000-0782.

Remedial Actions.
Accumulated boron deposited between the reactor head and the thermal insulation was removed during the cleaning process performed under W.O. 00-001846-000. No boric acid induced damage to the head surface was noted during the subsequent inspection.

Overview of the cleaning effort.
There are two areas requiring cleaning, the area above the insulation and the area below the insulation on the top of the reactor vessel head. The area above the insulation is accessible through the ventilation duct openings located approximately seven feet above the head flange. This area will not require cleaning since it was vacuumed and cleaned by FTI during the F10 and the D10 CRD gasket replacement effort. The area below the insulation on the top of the reactor vessel head will be accessible via the weep holes (other name is mouse holes). The cleaning media will be pressurized de-mineralized water heated to approximately 175 °F. Water will be sprayed on the boron deposits through the ventilation duct openings and through the weep holes. One weep hole will be used to drain the liquid out of the head to the plastic drums. The remaining weep holes will be blocked with a plastic tape. The plastic drums will be located outside of the head stand area at the base of the water shield tanks. Two-inch diameter corrugated plastic hose will provide means of transporting the liquid from the weep hole to the plastic drums. Accumulated liquid will be disposed off as directed by Radiation Protection (RP) personnel. The estimated volume of water used will be between 100 and 600 gallons. Some boron deposits are hardened and soaking time may be required.
Major challenges of the cleaning effort will be associated with spill protection. Recently installed inner and outer Reactor Vessel Head gaskets can not become soaked with the boric acid solution. To protect the gaskets, a number of protective measures will be taken.

- All but one weep hole will be blocked with the plastic cover. In the event the water is escaping from the covered weep hole the cleaning effort will be stopped and spill contained.
- All stud holes will be covered with plastic covers and secured with black tape. Should the liquid escape from the weep hole it will float toward the edge of the head and drip down on the floor surface. It is not likely that the liquid would continue its flow under the flange for approximately 30 inches to reach the gaskets.
- The spray and drain process will be coordinated such that when a spill is noted the spraying operation will be stopped immediately. Only small amount of water will be used at a time.

Another challenge of the cleaning effort will be associated with the protection of the CRDM motors. To prevent water damage to the motors the only area where water will be permitted and sprayed is located between the flange plane and the

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top of the insulation. The spray operator will be briefed about the need to control the spray and not to create any splashing. The operator will be briefed not to spray any water on the motor assemblies. Motor assemblies are sealed and are not easily impregnable with water.

ALARA considerations will include time/distance principle. The cleaning effort will mainly consist of preparation work. The cleaning effort is scheduled to last approximately 4 hours. The equipment operator will minimize his stay time in the "shine" area while spraying. If feasible a mirror will be utilized to inspect the results of spray at the ventilation duct openings area. After initial cleaning a video inspection will be performed by Framatome Technologies. Should additional cleaning be required the process will be repeated until most boric acid deposits are removed or as directed by RP.