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Presentation from Bruce Power

Présentation de Bruce Power

Event Initial Report

Rapport initial d'événement

Bruce Power

Failure of the primary heat transport pump seals at Bruce A Nuclear Generating Station Unit 4

Bruce Power

Défaillance des joints d'étanchéité d'une pompe du circuit caloporteur primaire à la tranche 4 de la centrale nucléaire de Bruce-A

Commission Meeting

Réunion de la Commission

March 15, 2018

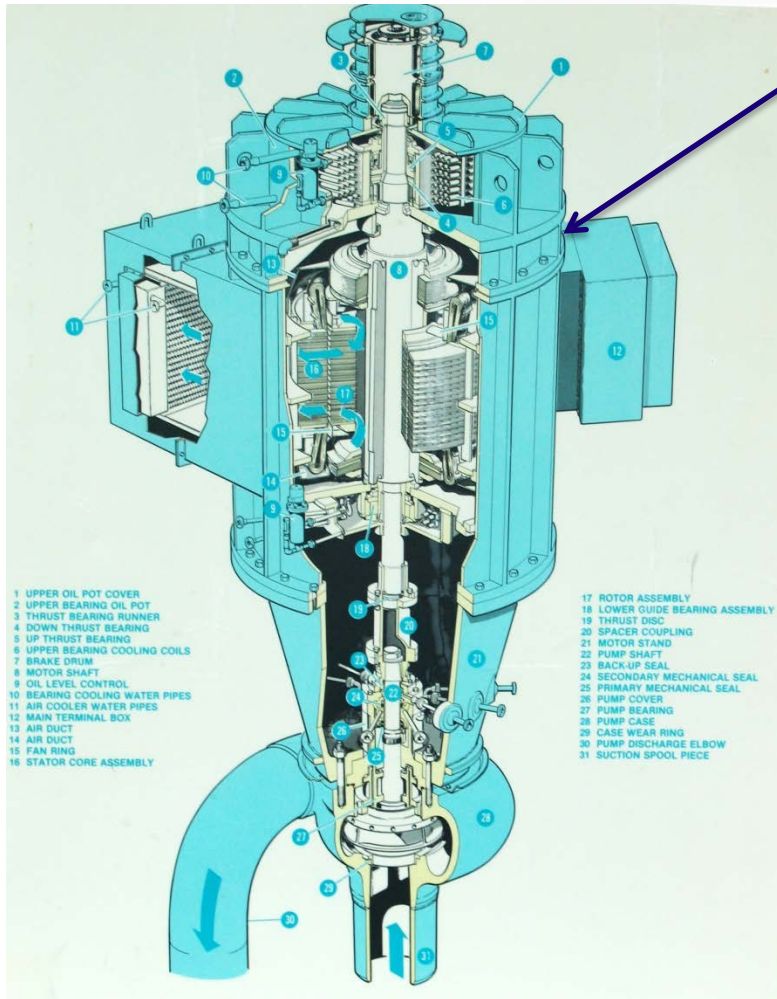
Le 15 mars 2018

Bruce A Unit 4 Primary Heat Transport Pump Seal Failure

15 March 2018 Commission Meeting



Key Components: pump



Pump Motor

Coupling

- Motor half coupling
- Extension
- Pump half coupling

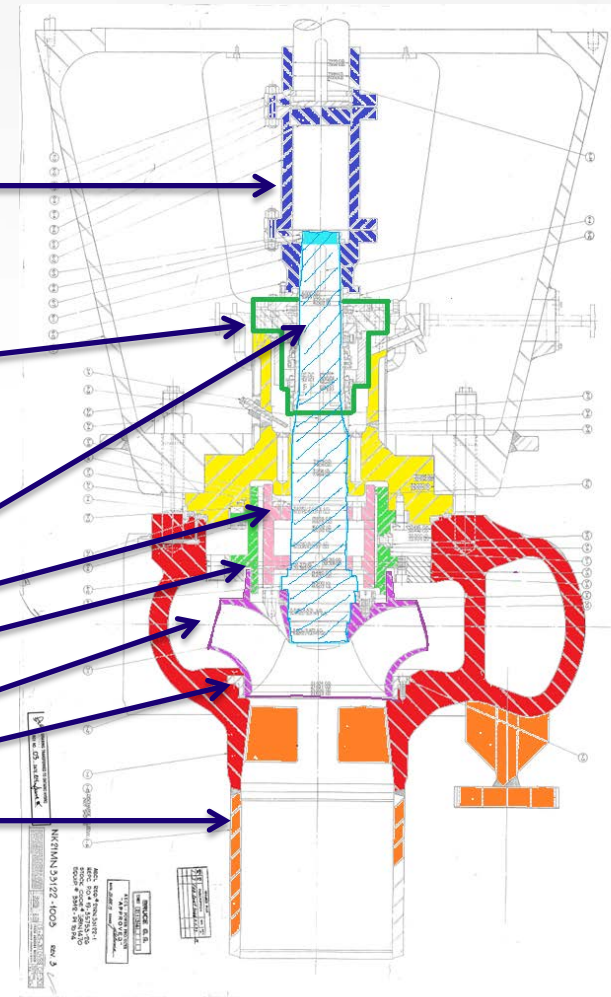
Pump Seal

Pump Assembly:

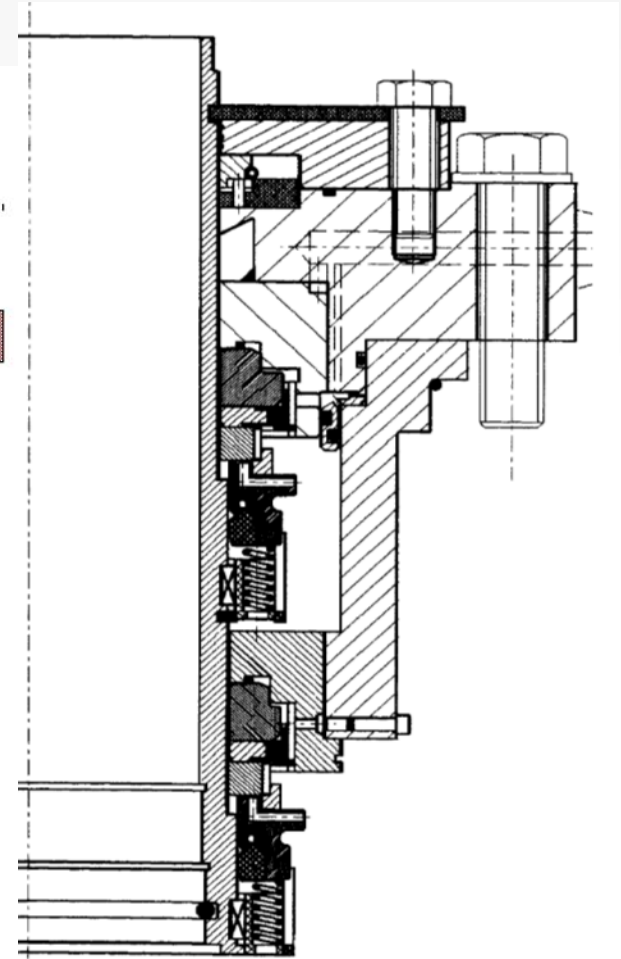
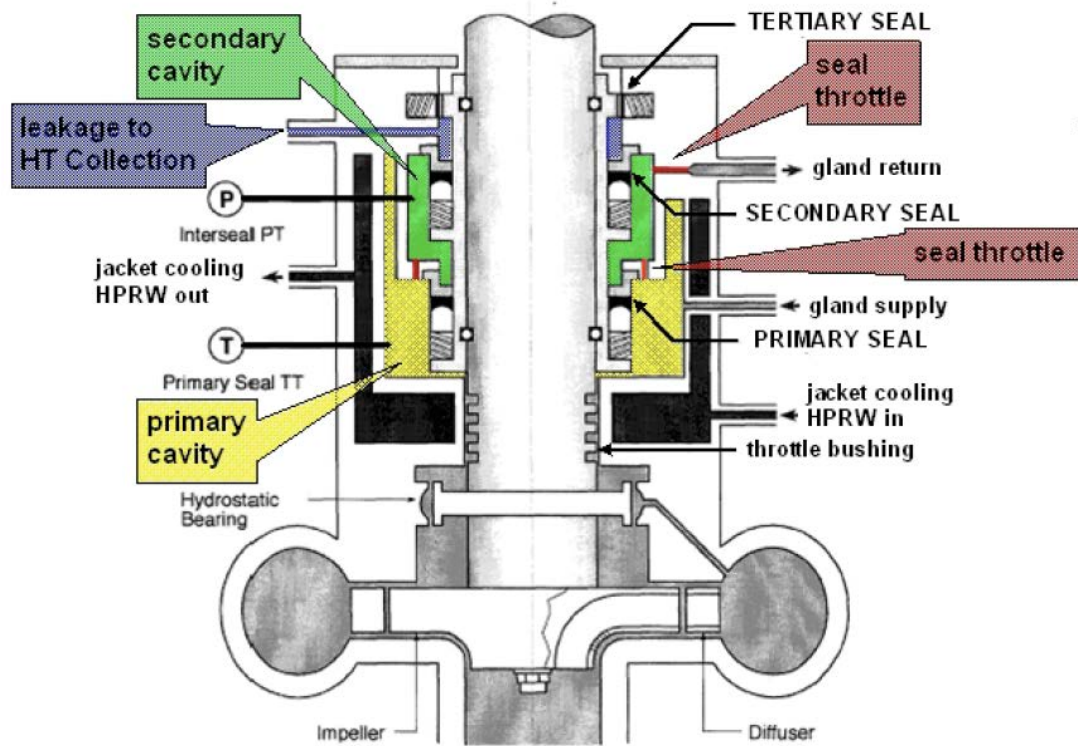
- Shaft
- Journal
- Hydrostatic bearing
- Impeller
- Wear Ring

System:

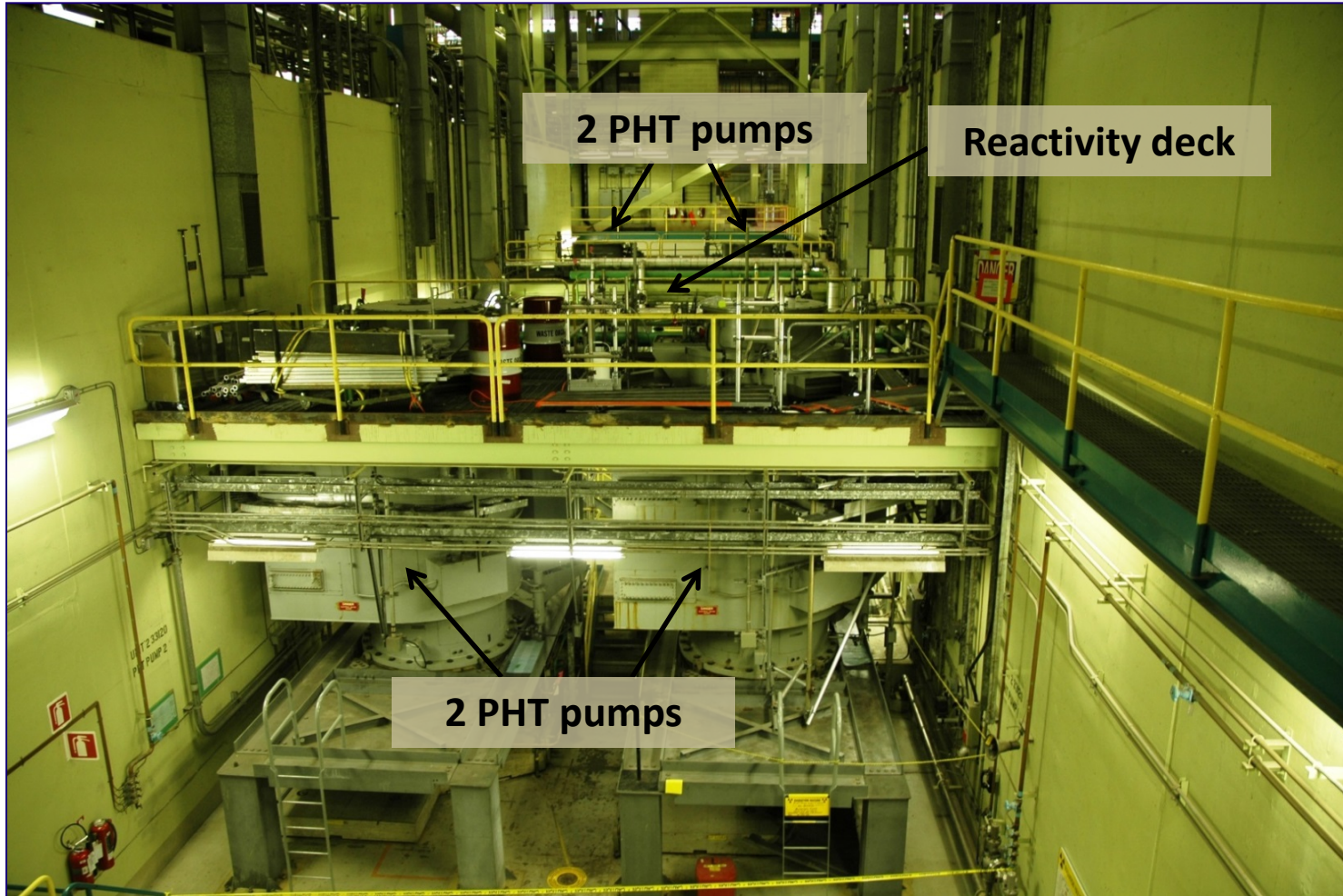
- Process system
- Interconnecting piping
- Pump supports



Key Components: seal



Primary Heat Transport Pumps



Background

- On 4 March 2018, Heat Transport Pump 4-33120-P4 experienced a dual-seal failure & tertiary bushing failure
- The unit was in stable full power operation at the time of the event
- Operators entered the Abnormal Incident Manual “HT Pump Dual or Triple Seal Failure” and manually tripped Shutdown System One
- The Bruce Power Emergency Response Organization was activated to provide support to Bruce A staff for recovery

Background - continued

- Complex troubleshooting is being conducted per Bruce Power procedures to identify potential failure modes through monitored & controlled disassembly of the various pump components
- Troubleshooting & initial forensic activities are on-going
- Root Cause investigation will be conducted

Consequences

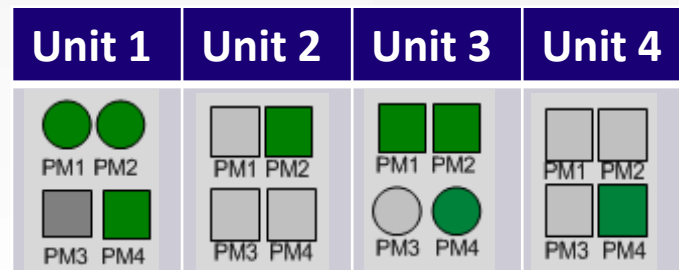
- No abnormal radiation dose received by station staff (Whole Body Counts and Bioassays conducted to ensure this)
- Small increase in tritium release to air from the station
- No release of water to the lake

PHT Pump Seal Replacement History

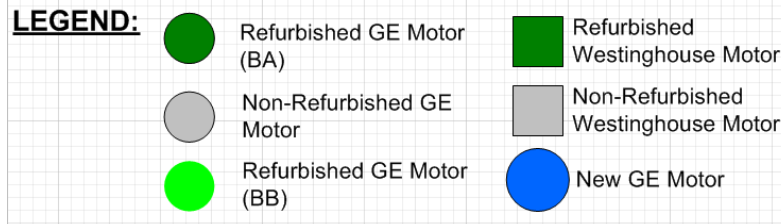
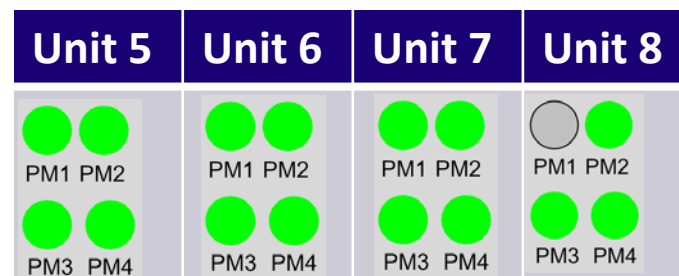
- Approximately 100 PHT Pump Seal replacements since 2003 across site.
- 82% of PHT Pump Seals replacement have been completed proactively.

PHT Motor Refurbishment Status

- Bruce A PHT Motor Refurbishment project is in progress (8 of 16 completed).



- Bruce B PHT Motor Refurbishment project is in progress (15 of 16 completed).



Actions

- Enhanced vibration monitoring had already been installed on Units 1 and 3 and Bruce B units were already so equipped
- Enhanced vibration monitoring instrumentation installation was planned for the current Unit 4 maintenance outage and will be completed before unit returns to service
- Operability review for all units completed and as a result the only remaining unit without enhanced instrumentation, Unit 2, was shutdown on 12 March 2018 to install the enhanced vibration monitoring
- Maintenance procedures updated to include tighter setup tolerances after seal replacement
- Additional forensics on Pump 4 motor will be undertaken as part of root cause

Summary

- All currently operating units are equipped with enhanced vibration monitoring on PHT Pumps; Units 4 and 2 will be equipped before returning to service
- Troubleshooting & initial forensic activities are on-going
- Formal root cause investigation will be completed
- Extent of condition review is complete & actions taken to ensure safe operation
- Longer-term actions will be determined upon completion of the forensics and root cause investigation