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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

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EVENT INITIAL REPORT (EIR)

E-DOCS-# 5474015

EIR: Failure of the Primary Heat Transport Pump Seals at Bruce A Unit 4	
Prepared by: Directorate of Power Reactor Regulation, Bruce Regulatory Program Division	
Licensee: Bruce Power	Location: Bruce A Unit 4
Date Event was Discovered: 2018-03-04	Have Regulatory Reporting Requirements been met? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Proactive Disclosure: Licensee: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> CNSC: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Overview	
Reporting Criteria: A declaration of an emergency, within the nuclear facility, where personnel or resources are mobilized by the licensee in response to an unexpected occurrence that creates a hazard to the safe operation of the nuclear facility, to the environment, to the health and safety of persons.	
Description: On March 4, 2018, with Bruce A Unit 4 Operating at 88.6% full power, indications of potential problem were received and unit shutdown was initiated. After shut down was initiated a leak developed on the gland seal of PHT pump 4. This caused approximately 5 drums of heavy water to leak out of containment, into a dyked area of the powerhouse, causing a tritium and loose contamination hazard in the area. As a precautionary measure, access to Bruce A was limited to essential personnel and clean-up occurred using appropriate personnel protective equipment. The leak was contained in a dyked area, however some increased airborne tritium emissions occurred which were later determined to be below Bruce Power's internal investigation limits and action levels Cause(s): A root cause of the gland seal failure is pending. Indications prior to the event and a similar event at Bruce A Unit 3 (August 2, 2017) suggests misalignment or imbalance of the rotating pump assembly.	
Impact of the Event	
On People: How many workers have been (or may be) affected? 30 How many members of the public have been (or may be) affected by the event? None How were they affected? There were no unplanned radiation exposures as a result of this event. The workers that were involved in the clean-up were wearing appropriate personal protective equipment (PPE). As a result, the total dose attributed to this event for all workers was 0.90 mSv, and the highest individual dose was 0.245 mSv which is well below regulatory limits	
On the Environment: Some tritium emissions occurred, however this was within the normal operating range (approximately 6% of the Action Levels) and through monitored pathways. There were no releases to the aquatic environment.	
Other Implications: none	
Licensee Actions	
Taken or in Progress: Upon receiving indications of an issue with the seals on PHT pump 4, shutdown of Bruce A Unit 4 was initiated by manually tripping Shut Down System 1. After confirming the pump seal failure Bruce Power used their Abnormal Incident Manuals to shut down the pump and depressurize the heat transport system in order to stop the leak. A leak from PHT pump gland seal is considered a design basis event. All safety systems functioned as required. All non-essential staff was evacuated from the station as a precautionary measure. A contamination control area was established to prevent the spread of radioactivity Bruce Power has initiated a Technical Operability Evaluation (TOE) as per BP-PROC-00014 to provide a substantiated engineering determination regarding the operability of the remaining Bruce units. Preliminary determinations are provided after 48 hours with final confirmation in 7 days. As a result of preliminary determination, Bruce Power has decided to take Unit 2 offline on March 11, 2017 to install additional vibration monitoring probes (Unit 2 is the only unit remaining without these additional probes). Bioassays for tritium from all station staff are being processed.	
Planned: Bruce A Unit 4 will remain shut down for a planned maintenance outage, which included installation of additional vibration monitoring probes. Bruce Power will be conducting a root cause investigation on this event as per their corrective action process, which will likely be completed before restart of the Unit.	

EVENT INITIAL REPORT (EIR)

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EIR: Failure of the Primary Heat Transport Pump Seals at Bruce A Unit 4

CNSC Actions

Taken or in Progress: CNSC staff are conducting a reactive Type II Inspection of this event. The inspection has the following objectives:

- Gather information and facts about the event
- Determine if the licensee's response to the event was adequate
- Confirm that the impacts to workers and the environment was minimal
- Determine if corrective actions from previous events were effective in mitigating the consequences of this event.
- Provide a recommendation on continued operation of Bruce units until the root cause can be determined and necessary corrective actions implemented.

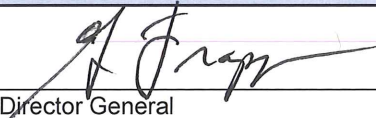
Planned: CNSC staff will review the detailed event report when submitted to confirm that the root cause is understood and that corrective actions have been established to prevent recurrence.

Additional reporting to the Commission Members anticipated:

- Yes
 No

If Yes, provide method of reporting:

CNSC staff will update the Commission upon completion of inspections and other assessments as part of the NPP Status Reports.

Name and Title	Signature
<p>G. Frappier Directorate of Power Reactor Regulation</p>	 <hr style="width: 100%;"/> <p>Director General</p> <div style="float: right; text-align: right;"> <p><i>March 8/18</i> Date</p> </div>

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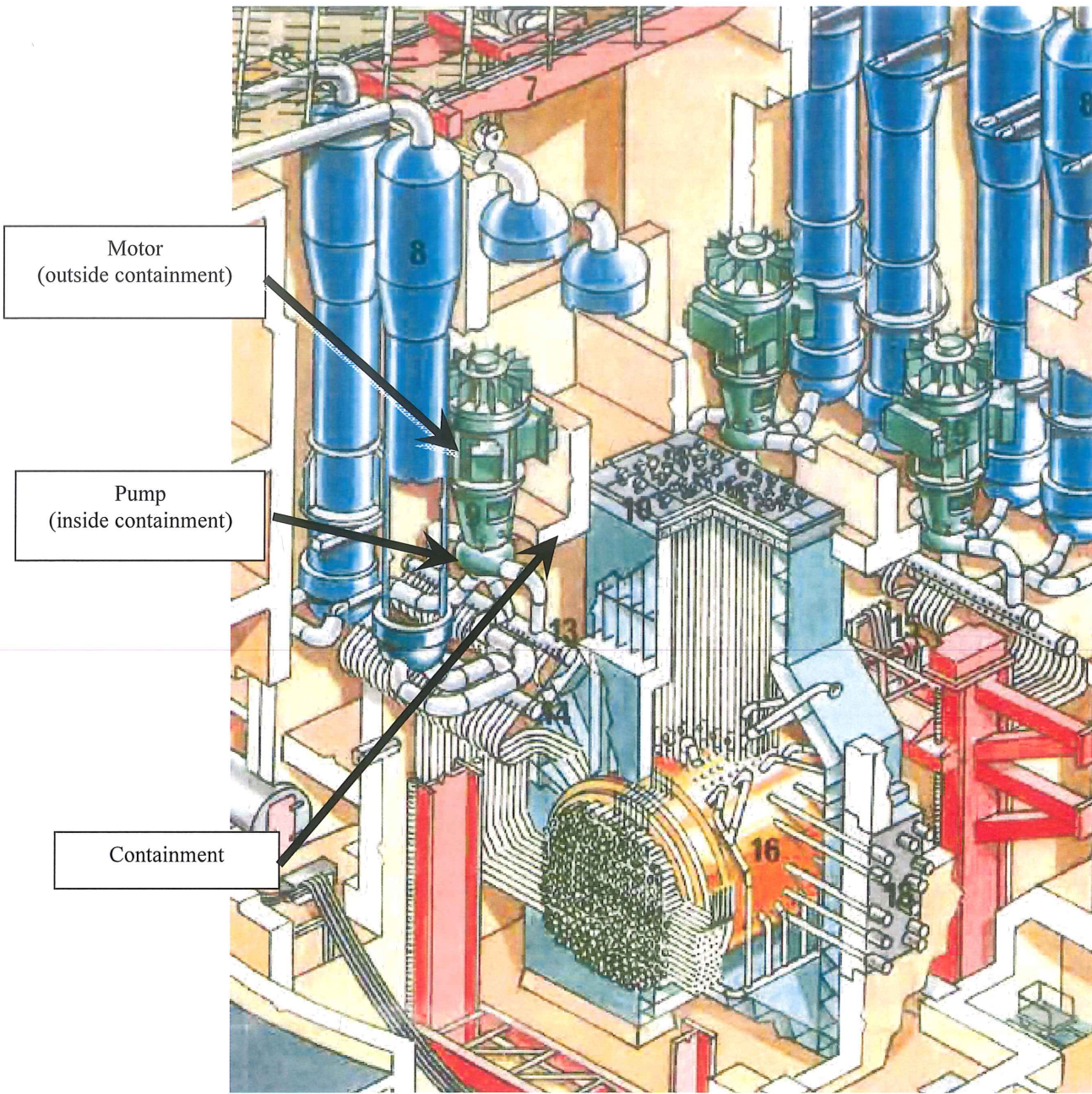


Figure 1: Simplified Motor and Pump location

EVENT INITIAL REPORT (EIR)

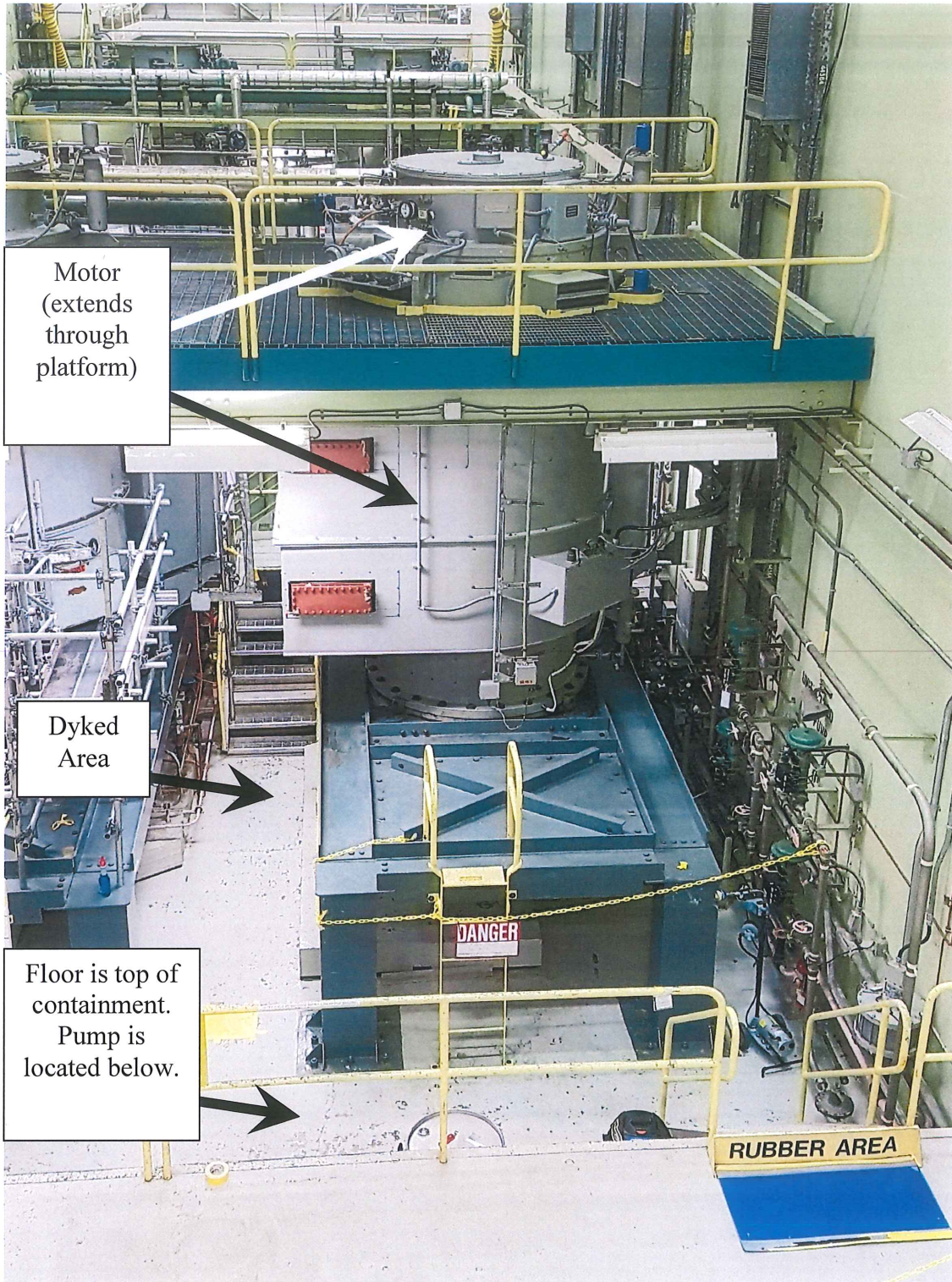


Figure 2: Bruce Power Unit 4 Pump Motor

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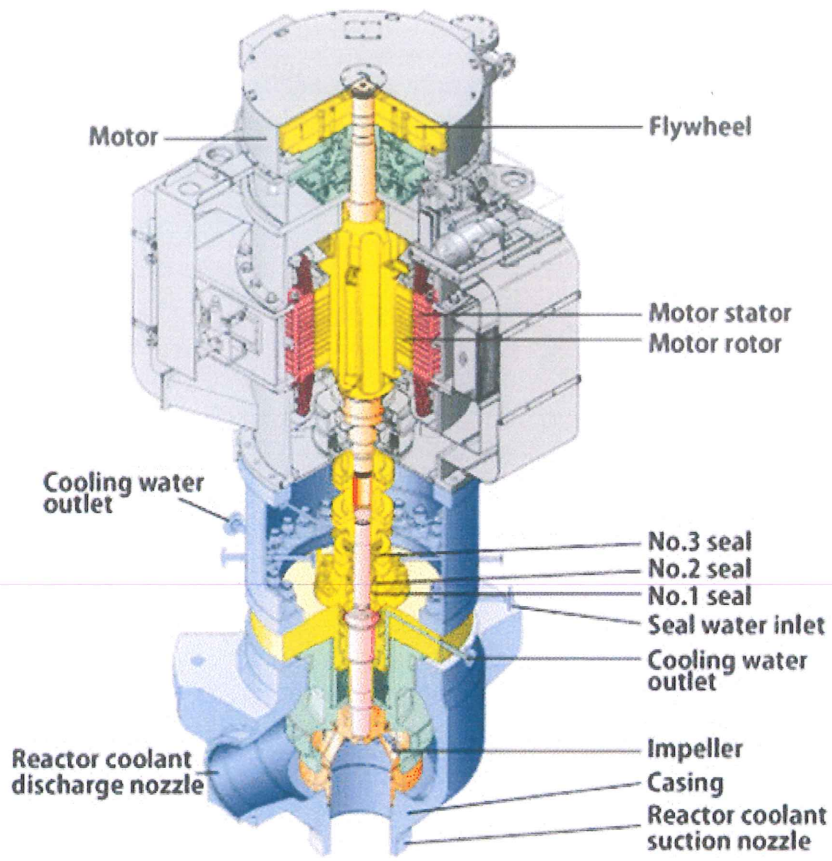


Figure 3: Simplified PHT Motor and Pump Assembly