



CMD 23-M20.1

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Presentation from Bruce Power

Présentation de Bruce Power

Event Initial Report

Rapport initial d'événement

Bruce Power

Bruce A Unit 4 Heat Transport
Purification System Heavy Water Leak

Bruce Power

Fuite d'eau lourde provenant du système
d'épuration du circuit caloporteur de la
tranche 4 de la centrale nucléaire de Bruce-A

Commission Meeting

Réunion de la Commission

June 28, 2023

Le 28 juin 2023

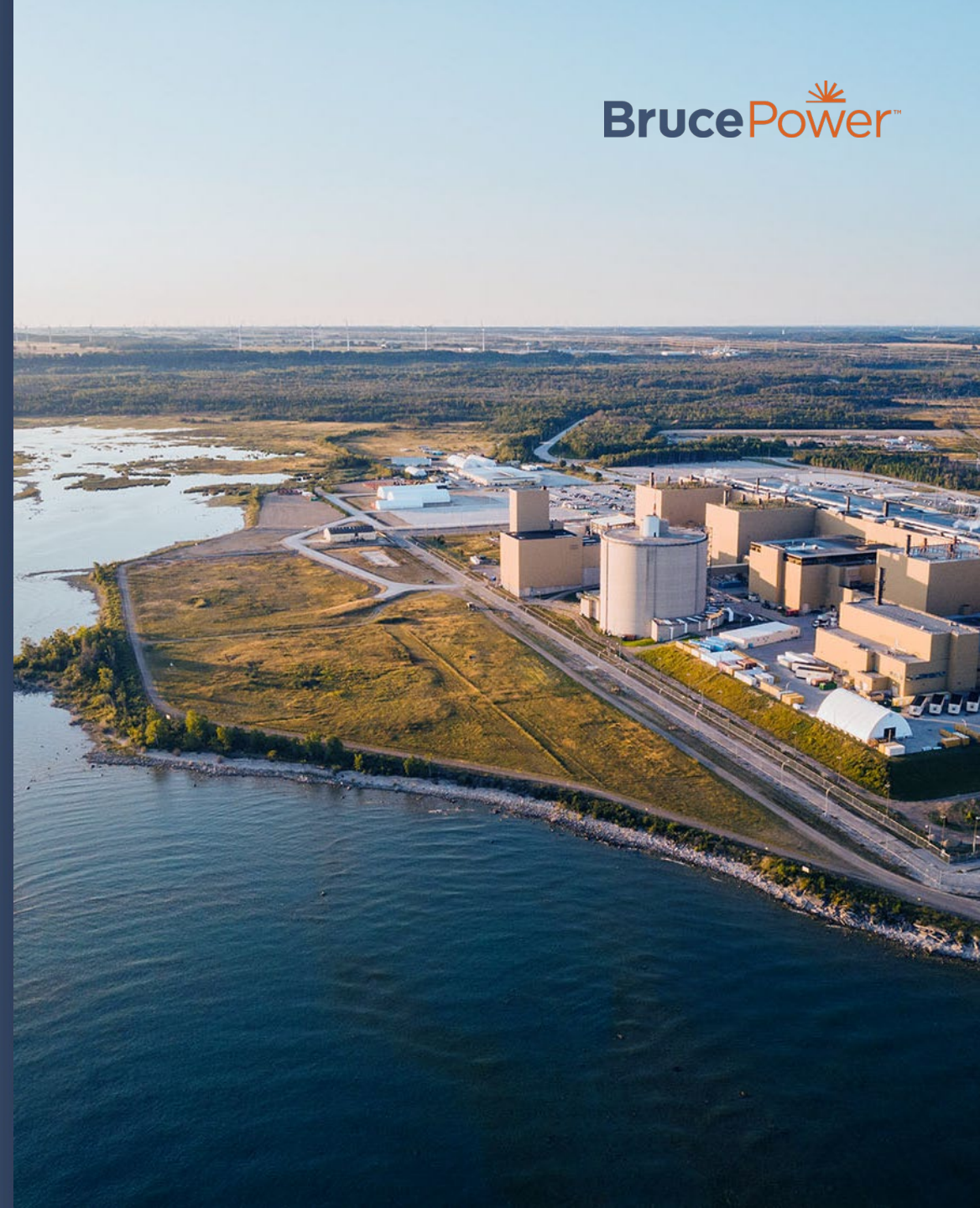
Bruce A Unit 4 Heat Transport Auxiliaries Heavy Water Leak

EVENT INITIAL REPORT

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JUNE 28, 2023



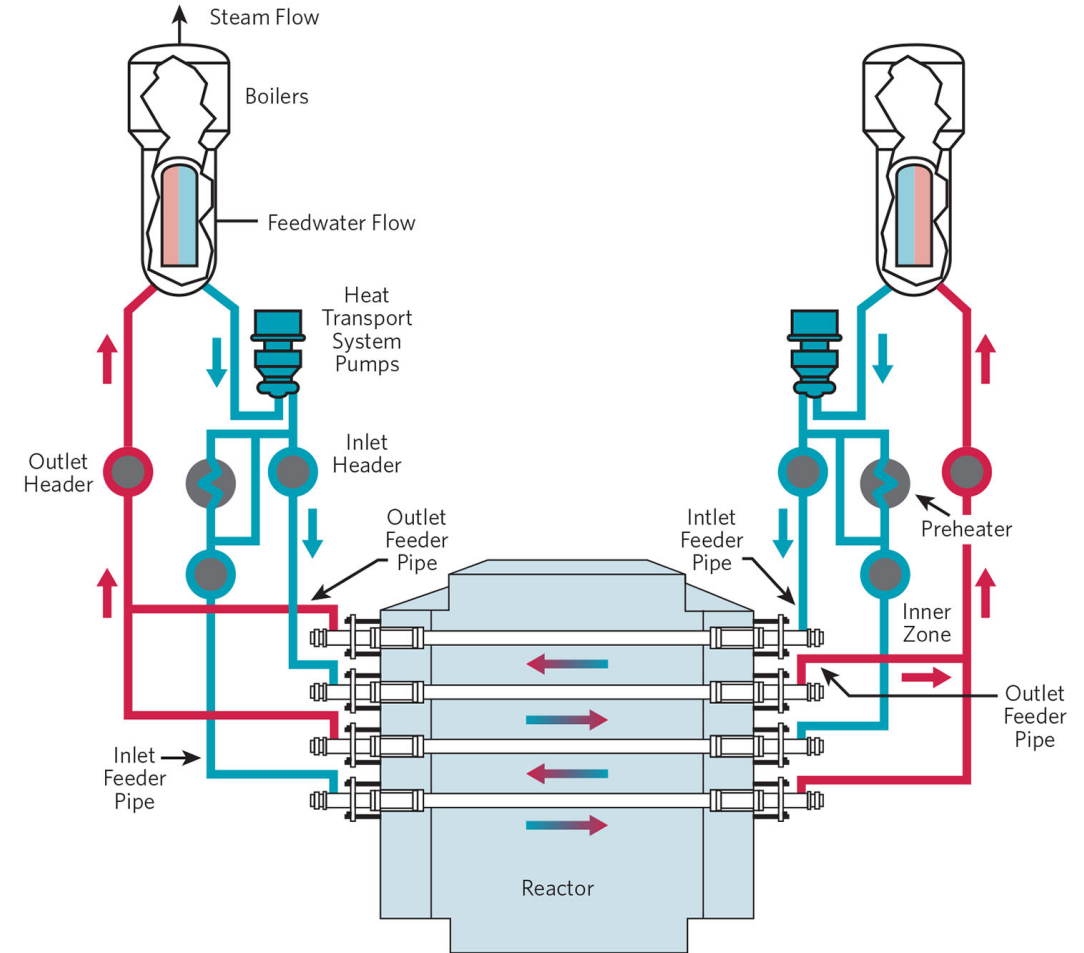
Event overview

- On April 25, operations staff discovered a leak of heavy water from the Unit 4 heat transport auxiliaries.
- Operations staff followed procedure and safely removed the unit from service and then took actions to stop the spill and safely clean it up.
- There have been no adverse impacts to employees, the environment or the public.



Event overview

- Heavy water from the heat transport auxiliaries contain levels of tritium which is a radioactive isotope of hydrogen.
- Testing of airborne radiological emissions confirmed that no regulatory limits were reached or exceeded.
- While initial observations suggested the spill was contained within the Bruce A station, investigations following the spill identified approximately 20 litres of heat transport water reached a drain and potentially made its way into the lake.



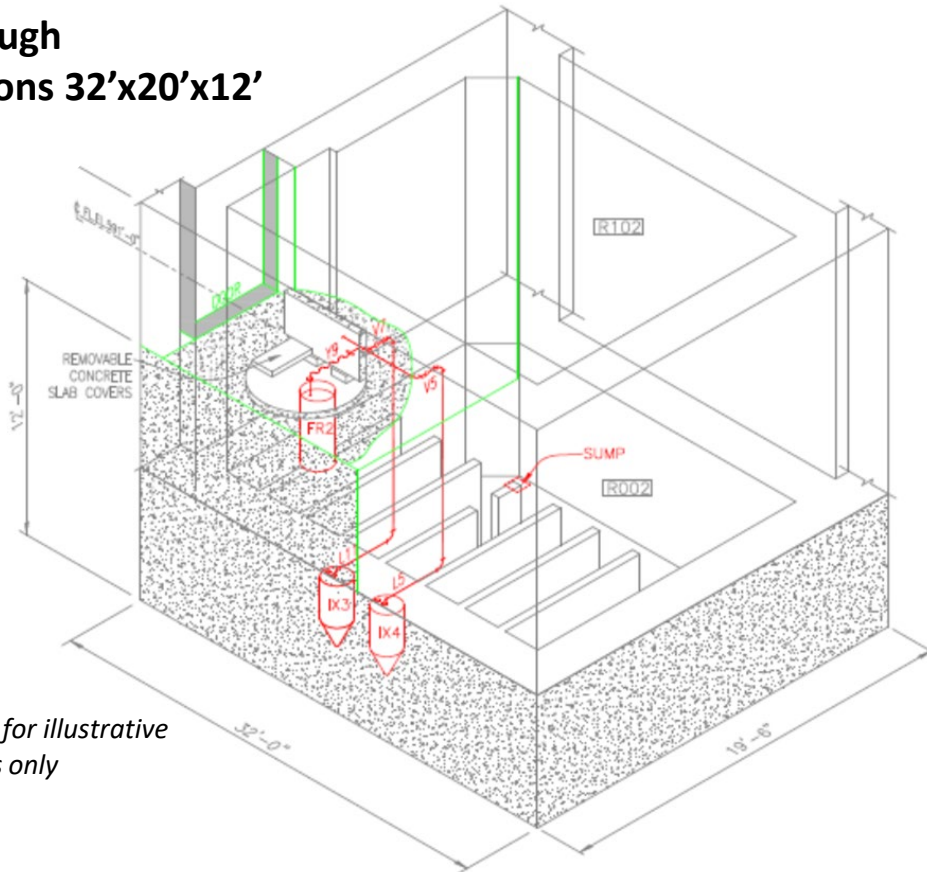
Sequence of events

- Certified Operators identified an increased heat transport leak rate in Unit 4 during the day shift on April 25.
- Operators conservatively removed the unit from service prior to any operational limits or safety system actuations.
- As the unit was removed from service, the leak rate appeared to degrade.
- The leak location was not detectable inside the containment vault nor outside of the vault.
- Unit cool-down and depressurization completed per operating procedures.
- Leak discovered in Rm. 102. Radiation alert declared and leak isolated.
- Emergency Management Center partially activated to support station clean up and mitigation.

Operators remained in control of safe shutdown and within operating limits to protect the people, plant, environment and public.

Event illustrations

Vault Rough Dimensions 32'x20'x12'



Drawing for illustrative purposes only



- Ruptured PHT Purification Hose was not isolated until after unit 4 was shutdown and depressurized.
- Leak detection system for the PHT filter room failed which challenged diagnosis of leak location.

Event response

- Bruce Power off-site Emergency Management Centre partially activated to support the station.
- Boundaries were established to prevent entry into the areas with elevated tritium.
- Response measures deployed to prevent the water from entering any drains into Lake Huron.



File photo – for illustrative purposes.

Nuclear safety

- No impact to Units 1 & 2 (Unit 3 in MCR).
- Unit 4 was shutdown and cooled down using normal plant procedures.
- Plant and personnel responded well during the shutdown with no other issues.



The unit was safely removed from service, and there was **no adverse impact** to employees, the environment or the public.

Radiological safety

- **No adverse impact** to the public as a result of the leak.
- **No exceedance** of a regulatory dose limit, (**annual worker dose limit 50 mSv**). No exceedance of a radiation protection action level.
- **24 First Responders** - rush bioassay samples during the initial event response. Highest individual uptake - 2.36 mSv (total collective dose 14.48 mSv).
- **162 samples** submitted from individuals in the station the night of the incident (not performing rad work), four received non-zero doses (total collective dose 0.12 mSv).
- **153 individuals** assigned non-zero doses as anticipated with planned clean-up and mitigation efforts for work up to May 11 (total collective dose 7.26 mSv).



Estimated total collective dose for initial event response, mitigation and clean-up measures, as well as others in the area, is **less than 21.96 mSv**.

Environmental safety

- Spill mitigation was proactively established at nearby open drains.
- Airborne radiological emissions from Bruce A were well below Environmental Action Levels.



Plant tritium emissions were minimally impacted by the event and were **well below Environmental Action Levels.**

Communication Internal

- 21 Global messages to staff
- 3 Leadership calls
- Increased Senior Leadership Team Engagement / Station presence for Q&A
- Operations debriefs
- Safety Culture Pulse Survey



Protecting our people, the plant and the environment.

Communication External

- Timely notification to Province, IESO and Municipality of Kincardine
- Prompt engagement with CNSC
- WANO/INPO
- COG Radiation Protection Working Group
- Event information posted on external website
- Industry peer OPEX sharing



Committed to **timely and transparent communication** with stakeholders and the public.

Communication Indigenous Communities

- In accordance with its protocol agreements, Bruce Power engaged contacts within the SON, the HSM and the MNO to inform Indigenous communities of the event occurrence, response activities, impact on people and the environment.
- Bruce Power maintains a bi-weekly touch point with the communities which offers an opportunity to further discuss the event.



Bruce Power takes its responsibility to protect the environment very seriously, and closely engages with local Indigenous communities.

Actions taken before unit returned to service

- All 8 hoses for U4 purification filters replaced.
- Additional camera installed in R002 as secondary leak detection.
- Interim operating procedure (ACM Op Memo) generated to aid in leak diagnostic. Specifically will go look for leakage in Rm 102 vault.
- Independent review of response by Governance Oversight & Learning (Training).
- Analysis of pressure tube and steam drum piping impacts completed with acceptable results.
- Operational review of return to service requirements completed.
- Station Leadership discussion with Site CNSC Director and Site Inspectors.



Site Plant Oversight Review Committee convened to ensure no nuclear safety concerns prior to returning the unit to service.

Conclusion

- Unit 4 was safely removed from service as a result of equipment failure, followed by cool-down as per operating procedures.
- Operators remained in control of the unit and initiated a proactive shutdown prior to any safety features.
- Immediate action taken to isolate the leak and mitigate impact to people and the environment.
- No adverse impacts to employees, the environment or the public as a result.
- Extent of condition checks completed at both stations and interim actions taken to address interim risk.
- Lessons learned through a Root Cause Investigation will be implemented with oversight rigor to track long-term corrective actions.

