



CMD 24-M33

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Event Initial Report

Rapport initial d'événement

Ontario Power Generation

Ontario Power Generation: Pickering
Nuclear Generating Station Unit 4
Loss of Class IV Electrical Power

Ontario Power Generation

Ontario Power Generation : Perte de
l'alimentation électrique de classe IV
à la tranche 4 de la centrale nucléaire
de Pickering

Commission Meeting

Réunion de la Commission

September 12, 2024

Le 12 septembre 2024

EVENT INITIAL REPORT (EIR)

e-Doc 7316687

EIR: Pickering NGS Unit 4 Loss of Class IV Electrical Power	
Prepared by: Directorate of Power Reactor Regulation – Pickering Regulatory Program Division	CMD 24-M33
Licensee: Ontario Power Generation Inc.	Location: Pickering Nuclear Generating Station
Date Event was Discovered: 2024-05-18	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: From Event Initial Reporting (EIR) Process document: 4) Any actuation of a special safety systems that was caused by an unexpected circumstance or combinations of circumstances from which the industry should learn lessons to prevent recurrence. (i.e. not just spurious trips).	
Description: On Saturday May 18, 2024 at 19:09, while Pickering Nuclear Generating Station (PNGS) Unit 4 was operating at 84 % Full Power (FP), the Hydro One switchyard connecting PNGS to the electrical grid experienced a protection circuit fault on a Hydro One 230 kilovolt (kV) breaker. The protection circuit contains a number of breakers that automatically open to break the electrical circuit when an electrical fault is detected and is part of the design of the Hydro One switchyard to detect and prevent electrical faults from damaging equipment or injury to personnel. Due to the breakers opening, the turbine generator was disconnected from the electrical grid and could not supply power to the unit. At this point, the Unit switched all electrical supplies from the Generator Service Transformer (GST) to the System Service Transformer (SST) to draw power from the electrical grid to supply power to the Unit to run systems non-essential to nuclear safety, such as lighting and the Main Heat Transport Pumps. This non-essential electrical supply is known as Class IV electrical power. Following the transfer from the GST to the SST, an automatic reduction in reactor power occurred accordingly. As per the design, steam flow to the turbine was reduced due to the automatic reduction in reactor power. The Unit 4 Steam Reject Valves (SRVs) opened as designed to divert excess steam from the turbine to the atmosphere. The steam is from the Feedwater System which is on an independent loop from the coolant and does not pose a radiation risk to the public, personnel or the environment. The opening of the SRVs and release of steam resulted in a plume of steam that was audible and visible to the public, leading to media attention. The protection circuit was designed to open the main generator field breaker, which would have shut down the turbine-generator. However, it failed to do so because the relay in the switchyard requires a sustained 60 millisecond signal, whereas the fault signal was only sustained for 10 milliseconds. This caused the turbine-generator to attempt an automatic transfer of power supply from the SST to the GST. However, the GST had already been isolated by the protection circuit breakers opening. Therefore, neither GST nor SST was supplying power to the unit, resulting in a total loss of Class IV electrical power. As the Unit was no longer able to power the Main Heat Transport Pumps, this caused the heat transport coolant flow to reduce below the shutdown system trip setpoints. As a result, both shutdown systems automatically tripped to safely shutdown the reactor. As per the design of the electrical system, the Standby Generators for Unit 4 automatically started to provide power to critical loads to allow the unit to safely shutdown and maintain cooling to the fuel. On May 19, 2024 at 02:35, Class IV power from the electrical grid was restored and Standby Generators were no longer required to supply power to critical loads. Fuel cooling was maintained at all times and the Unit successfully transitioned into a Guaranteed Shutdown State in accordance with station procedures. The fuel was not subjected to unusual conditions, there were no fuel failures and no radioactive releases that posed a risk to the public, personnel or the environment.	
Cause(s): OPG is in the process of finalizing the root cause investigation report. At this time, OPG has identified the root cause as a spurious failure and design deficiency of the switchyard protection breaker relays.	
Impact of the Event	
On People: How many workers have been (or may be) affected? <u>0</u>	

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EIR: Pickering NGS Unit 4 Loss of Class IV Electrical Power
How many members of the public have been (or may be) affected by the event? <u>0</u>
How were they affected? N/A
On the Environment: None
Other Implications: Auxiliary Irradiated Fuel Bay (AIFB) lighting (IAEA safeguards equipment) was lost as a result of the loss of Class IV power. Audible and visible stream release drew the attention of public and media. CNSC did not receive any public or media inquiries.
Licensee Actions
Taken or in Progress: <ul style="list-style-type: none">Standby Generators started as expected to provide power to critical loads as the Unit was safely shut down and placed into GSS.OPG provided a courtesy notification to CNSC staff on May 19, 2024 at 16:24.OPG also immediately notified International Atomic Energy Agency (IAEA) of the disruption to safeguards equipment (lighting). Safeguards equipment was returned to service upon the restoration of Class IV power on May 19, 2024.OPG issued a Public Information Notice (PIN) to emergency services, municipalities and a predetermined list of stakeholders.OPG submitted the Preliminary Event Report (PER) to CNSC staff in accordance with REGDOC-3.1.1 requirements on May 24, 2024.The protection breaker relays on the 012 and 034 switchyard were replaced with an updated design.OPG confirmed the design deficiency does not exist on the protection breaker relays of the PNGS 058 and Darlington Nuclear Generating Station (DNGS) switchyards. The relays on the PNGS 058 and DNGS switchyards would not cause a similar initiating event should they encounter the same spurious failure as PNGS Unit 1 and 4.OPG is in the process of finalizing further corrective actions. Planned: <p>OPG will submit the Detailed Event Report (DER) to CNSC staff in accordance with REGDOC-3.1.1 requirements by November 15, 2024.</p>
CNSC Actions
Taken or in Progress: <ul style="list-style-type: none">The on-call CNSC Duty Officer (DO) received three notifications from OPG:<ul style="list-style-type: none">At 11:04 on May 18, 2024, a call was received by the DO reporting the loss of Class IV electrical on Unit 4.At 02:28 on May 19, 2024, a call was received by the DO reporting on a loss of lighting to the Auxiliary Fuel Bay that affected IAEA safeguards equipment.At 06:56 on May 19, 2024, a subsequent call was received by the DO to provide an update to the ongoing issues with the lighting.The DO notified the Regulatory Program Director, who indicated the event was now being managed by the Pickering Regulatory Program Division.CNSC staff met with OPG to discuss the event the following business day and confirmed the Unit was shutdown safely.CNSC staff performed an independent assessment to verify that the transient could not have resulted in damage to the fuel.CNSC staff attended OPG's decision making meeting in response to the transient to verify that the Unit was able to safely return.CNSC staff determined that OPG met CNSC regulatory reporting requirements, as per REGDOC-3.1.1.

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- CNSC staff monitored news and social media and public communications were prepared and poised to respond, if required.
- CNSC staff reviewed a summary of the root cause investigation while the report was being finalized by OPG.

Planned:

CNSC staff will review OPG's finalized root cause investigation report, corrective action plan and Detailed Event Report (due November 15, 2024), and follow-up with OPG, as required, through compliance verification activities.

Additional reporting to the Commission Members anticipated:

Yes

No

If Yes, provide method of reporting: Not applicable.

Name and Title	Signature
Ross Richardson on behalf of Alexandre Viktorov, Director General Directorate of Power Reactor Regulation	