
MEMORANDUM**AC-C 6-2023****Subject:** Impact of Winter Storm Elliot on the Crystal Beach WWTP**Date:** March 27, 2023**To:** Audit Committee**From:** Jason Oatley, Manager, Quality and Compliance

This memo provides Council with information on the impact of Winter Storm Elliot on the operations of the Crystal Beach Wastewater Treatment Plant (WWTP) between Dec. 23 and Dec. 27, 2022. The extreme weather event resulted in a loss of electrical power to the plant. As a result, plant operations were impacted and sewage bypassed treatment at the Crystal Beach WWTP from Dec. 25 until Dec. 27 and was released to the environment.

A Winter Storm watch was issued on Dec. 21, 2022. On Dec. 22, this was upgraded to a Winter Storm Warning and a Blizzard Warning for Friday, Dec. 23 until Saturday, Dec. 24, 2022. In response to this increased awareness of an impending storm, the Water & Wastewater (W&WW) division increased staffing levels at key facilities, ensured standby power generator fuel tanks were topped up with fuel and issued warnings to staff.

Staffing Levels

Niagara Region has wastewater treatment facilities in Fort Erie (Anger Avenue WWTP, Crystal Beach WWTP, Stevensville Lagoon), in Port Colborne (Seaway WWTP) and Welland (Welland WWTP). The Region also operates water treatment plants in Fort Erie (Rosehill WTP) and Port Colborne (Port Colborne WTP).

The Crystal Beach WWTP is staffed with one operator Monday to Friday 7:00 a.m. until 3:00 p.m. Outside of these hours, operators at the Seaway WWTP in Port Colborne monitor the Crystal Beach WWTP and its three (3) sewage pumping stations through the plant SCADA system. The Seaway WWTP staff monitor their plant and 18 stations while monitoring the Crystal Beach WWTP and its three (3) stations. Similarly, the Anger Avenue staff monitor their plant, the Stevensville Lagoon and 10 stations.

Due to available staffing, only a single operator is on-shift after 7:00 p.m. at most Niagara Region WWTPs. The Queenston WWTP and Stevensville Lagoon are

monitored remotely and operators attend the sites to conduct testing and for security checks.

Storm Details

The extreme winter storm began Friday, Dec. 23 hitting the areas of Fort Erie, Port Colborne and other southerly communities. Heavy rain changed to snow and temperatures dropped rapidly leading to flash-freeze conditions on roadways. Wind gusts for 120 km/h in southern Niagara were encountered. Snow accumulations of 25-50 cm were also seen (higher amounts due to drifting snow from high winds).

On Friday, Dec. 23 utility power began to fail in many areas of Fort Erie. Utility power losses began at Erie Road Sewage Pumping Station (SPS) around 8:17 a.m., Nigh Road SPS at 11:26 a.m., and Shirley Road SPS at 2:40 p.m. The power at the Crystal Beach WWTP went out after the operator had left at 3:00 p.m. As the storm intensified, plant and sewage pumping stations in many areas of south Niagara were all running on standby generators as power was out across Fort Erie and much of Port Colborne.

Many facilities, homes and businesses were affected by the power loss. The storm was severe enough to be a named storm – Winter Storm Elliot. In addition, both Niagara Region and the Town of Fort Erie declared a State of Emergency at 8:30 a.m. on Saturday, Dec. 24 due to the blizzard conditions and power outages throughout the area.

On Saturday, Dec. 24 the Crystal Beach plant was running on standby power and being monitored by staff at the Seaway WWTP. Just after midnight (00:03 Sunday, Dec. 25), the Seaway plant lost communication with the Crystal Beach WWTP; therefore, the staff at Seaway could no longer see the Crystal Beach plant status. Losing remote communication is a common occurrence during a storm and normally, when this occurs, staff are dispatched to monitor the remote plants in person. However, as states of emergency were being declared, the weather conditions made travel near impossible. In addition, cellular communications were out in the area due to a cell phone tower being damaged. Staff from the Port Colborne plant could not make their way to Crystal Beach to check on the plants status due to concerns with being stranded away from the plant. Staff at the Anger Avenue WWTP in Fort Erie also could not exit the plant due to the Niagara Parkway being impassable. Staff already on shift at both Port Colborne and Fort Erie facilities stayed past their shift-end and physically remained on site at the plants as they could not safely return home. The operator at the Fort Erie plant was on duty for 52 hours. The Seaway plant operator was on shift for over 30 hours.

On Sunday, Dec. 25 in the late afternoon, the weather had improved but communications were still out between Seaway and the Crystal Beach plant. The Seaway WWTP Operator was able to get to the Crystal Beach plant at approximately 8:45 p.m. Upon entry, the operator discovered that the utility power was back on in the control building but that the plant was not operating. Upon further inspection, the operator discovered that the generator room was flooded with water and that sewage was entering the plant building from the wet well areas as the plant pumps were not running. It was later determined that water lines in the generator room had frozen and burst, drenching the electrical panels with water and preventing the generator from running.

Without the plant pumps running, and with a key valve remaining in the open position, sewage bypassed the sewage plant and entered the storm sewer system and then eventually to Lake Erie. Maintenance staff were quickly on site to begin pumping out the water and sewage mixture so that the plant equipment could be worked on. Working day and night, the sewage pumps were turned back on at 12:20 p.m. on Tuesday, Dec. 27. The duration of the sewage spill is believed to be from approximately Sunday, Dec. 25 00:30 until 12:20 p.m. on Tuesday, Dec. 27 (approximately 60 hours).

Key Causes

- Loss of utility power from damaged power lines: Prolonged power outages are a frequent occurrence in Fort Erie. Plants are designed with standby power generators. These generators are powered by diesel engines. The fuel tanks typically have sufficient fuel for 12 to 24 hours of continuous operation. The duration of the power outage was longer. If the plant had of been running on utility power, this event would not have occurred.
- Loss of generator power: When the generator is running, louvers open inside the generator room allowing heat to escape to keep the generator cool. High winds and sub-zero temperatures allowed snow and ice to enter the generator room. The room temperature dropped to below freezing causing water lines in the generator room to freeze and burst. The water flooded the electrical panels causing shorts that prevented the generator from running. Without the generator running, the plant power was lost.
- Loss of sewage pumping: Without utility power and without the generator running, the sewage pumps stopped pumping. An electrically actuated valve controls the flow of sewage into the plant. Without power, the valve remained open, which allowed

sewage to enter the plant. Without the pumps running, the sewage overflowed that wet well and entered the plant causing damage to the pump electrical disconnects. This prevented the pumps from being turned back on once power was restored as they were flooded.

- Due to the holiday season, many staff were on vacation or unavailable. Few staff are on-shift during evenings and weekends at the larger plants and no staff are present in the remote facilities.

Reporting

Upon discovery of the sewage bypassing the plant on Dec. 25, 2022 the operator contacted the Ministry of Environment, Conservation and Parks (MECP) spills action centre (SAC) to report the issue. When the pumps were placed back in service, the operator of the plant followed up with another call to the MECP SAC to let them know the plant status.

The MECP requires a written spill report to be submitted with 10 working days of an environmental incident such as this. Staff requested an extension of the deadline for the written report on Dec. 29, 2022 so that the Region could have the opportunity to conduct a debrief on the event when more staff were available after the holidays. An extension until Jan. 23, 2023 was granted by the MECP.

A debrief session was held on Jan. 12 to review plant logs, SCADA alarms and get feedback from staff who were on site during the event. A debrief is used to determine the root cause of the spill and examine ways to prevent this type of incident from re-occurring. Staff from the Crystal Beach and Seaway WWTPs as well as management and compliance staff were present. On Jan. 26, a second debrief was held with staff from the Town of Fort Erie to get their input from issues they had encountered. A formal written spill report was submitted to the MECP on Jan. 23, 2023 that reported an estimated spill volume of 25-30 ML. The receipt of the report was acknowledged by the MECP.

Actions (taken or planned)

As an output from the two debrief sessions, a number of actions were initiated by staff.

These include:

- Remove water lines in the generator room at the Crystal Beach WWTP and investigate other facilities to prevent this issue from happening.

- Install a windbreak by the generator louvers to lessen the impact of wind off the lake on the generator intake.
- Enable “roaming” on W&WW staff cell phones. The roaming feature was disabled on corporate cell phones which limited that ability of the cell phones to be used with other wireless carriers in the event that the main carrier is inaccessible in emergencies.
- Explore opportunities to use 2-way radios with Town of Fort Erie and Regional staff during emergencies when cell service is not available.
- The bypass valve has been replaced with a new unit that has a battery back-up feature that will close the valve if needed upon a power failure.
- The Town of Fort Erie was made aware that the Rosehill WTP, Anger Avenue WWTP and Crystal Beach WWTP require higher priority for snow removal during severe storms to ensure staff access.
- Explore staffing at the Crystal Beach WWTP and other facilities to ensure adequate number of staff are available at all times.

Respectfully submitted and signed by

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