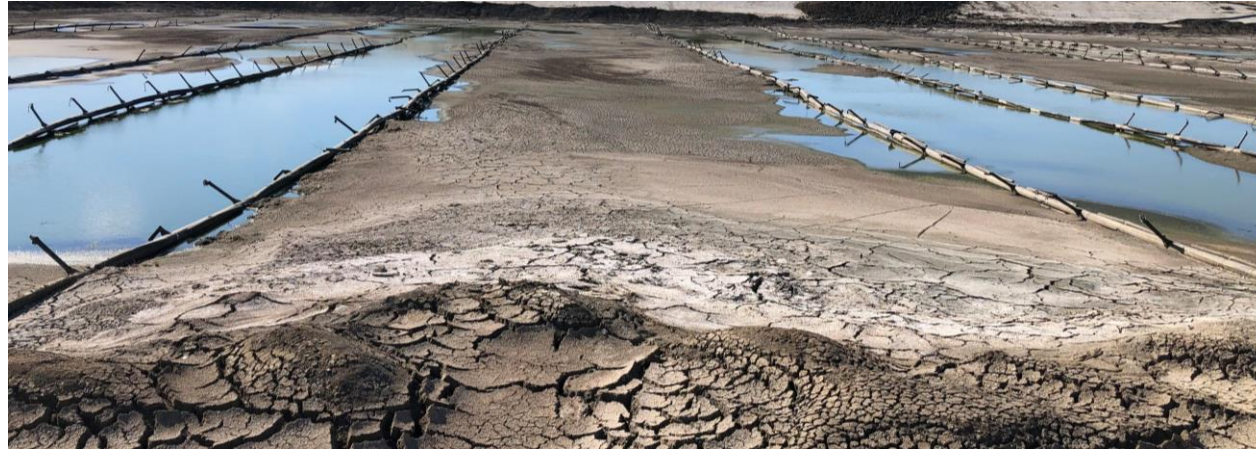




Associated
Environmental



Platinum
member



Regina Wastewater Treatment Plant

Contaminated Sludge Remediation

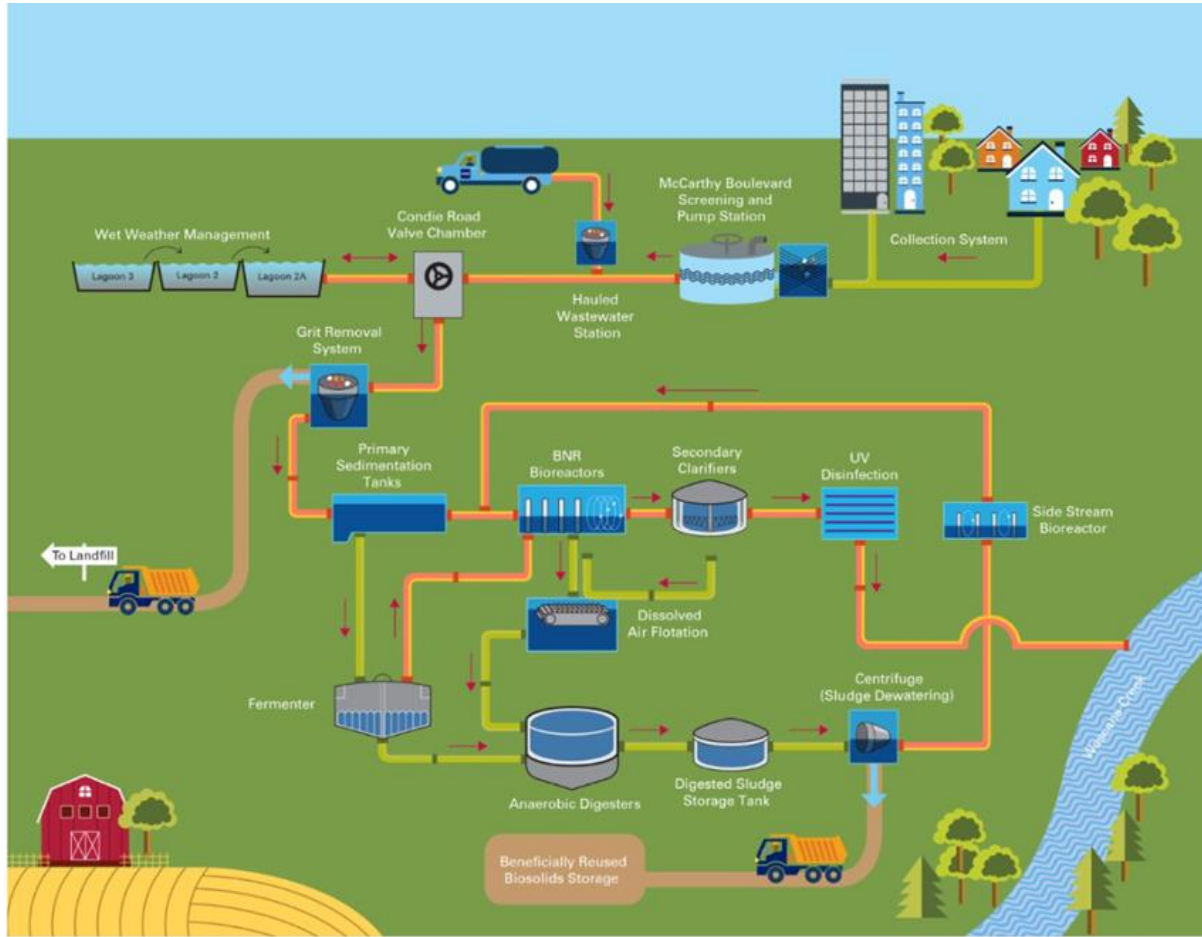
Kerri Walker, P.Biol. EP

October 2023



Regina WWTP System

System Overview



The Event

Emergency Response

- May 22, 2020: the City of Regina's operators called to inform that they were seeing tar in the influent and to be alert as it was on its way to the WWTP through the 5km forcemain.



May 22 & 23, 2020



Cell 2A

- Cell 2A is used as the containment cell in the WWTP network and used for storm surge retention.
- Cell 2A had some 33,000 m^3 of sludge prior to the event (important issue for later on).
- The old aeration system is still in place and used to maintain aerobic conditions as needed.
- Was part of the old WWTP aerated cell configuration.

The Oil Slick

May 22 & 23, 2022 – Impacts seen on Cell 2A



The Initial Clean-up Attempts

Initial Cleanup Attempt

May 22 – 29, 2022 – attempted to clean using Hydrovac



Investigation and Options

Initial Steps

- Associated Environmental conducted a visual assessment in June.
- It was observed that the oil was on the surface, floating within the water column and settling on the sludge.
- Water and sludge samples were collected to assess the general concentrations as a starting point.
- Initial results showed F2 – F4 concentrations in the sludge ranged from 20,000 mg/kg to 40,000 mg/kg
- F1 fraction was minimal – very heavy hydrocarbon chain

Step 1 - Dewatering

- Water column held very little oil
- Majority found in sludge
- Decision to pump Cell 2A dry – oil boom used and floated around the intake
- Attempt to dry sludge



Oops - Sludge did not dewater

- Track hoe was used to remove the surficial sludge and pile it onto the bank.
- Dried contaminated sludge would then be transported to the designated disposal facility.
- The approach did not work out as:
 - Sludge was too moist to be able to stay on the bank.
 - The natural drying process did not work as efficiently as expected.
 - Did not have sufficient temporary storage space onsite for the estimated quantity.
 - Delays caused by rainy weather.

Step 2 - Freeze and Scrap

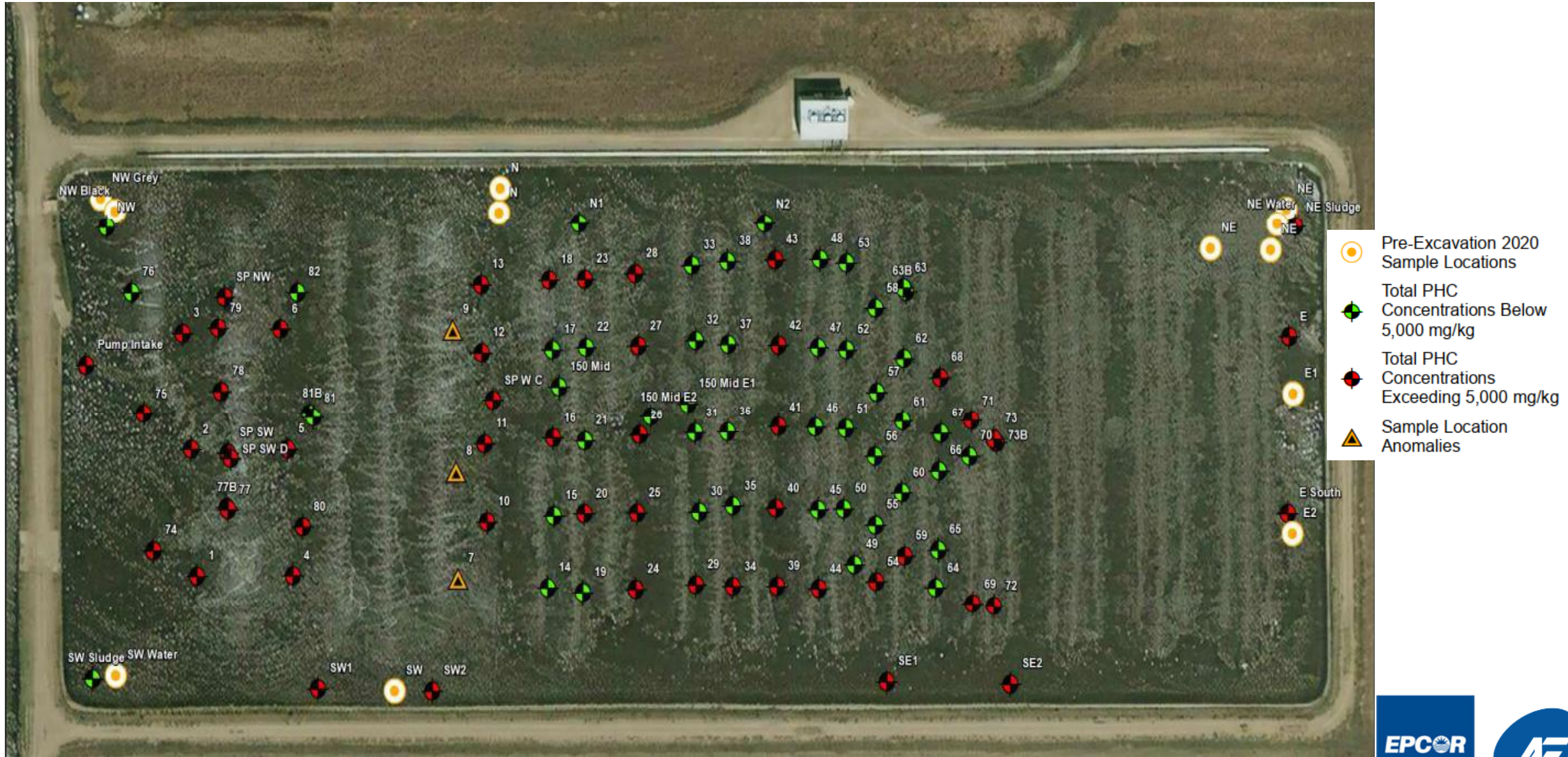


Analytical

What it looks like



Sample Locations



General Logistic Issues

Could not just dig all the sludge out

- Oil spill owner took responsibility for the event and agreed to reimburse the City for the clean-up cost.
- Would only pay for sludge removal that was confirmed to be contaminated.
- Had independent consultant collecting samples to confirm process.
- No concerns over approach used was raised by the independent consultant.

Mother Nature

- Weather
 - Major thunderstorms and power failure in July and August affected the normal plant operation which resulted in adding additional volume to Cell 2A while dewatering. These caused additional dewatering time.
 - Early spring thaw: by late March it was determined that the soft cell bottom conditions made it nearly impossible to move equipment around the cell and effectively remove any further materials.

Integrity of Lagoon

- Maintaining the integrity of the clay lined bottom
- The excavation depth – only to the point where PHC concentrations reached an acceptable level.
- Excavation between the aeration lines – made excavation more difficult in some areas. Some in-situ materials were left under the aeration lines.

Remediation

Survey for Volume Removed

- Based on Cell 2A's dimensions and actual excavation extents approximately 80% of the initial impacted footprint was removed.
- A progress survey was conducted in the excavation approximately twice a week to verify volume removed and to compare with material weighed at the disposal facilities.
- By late March 2021, it was determined that the soft cell bottom condition made it nearly impossible to move the equipment around the cell and effectively remove any additional sludge at the remaining eastern portion of Cell 2A, leaving an estimated 2,000m³ of contaminated sludge in place.
- Total 44,800m³ of material was removed and disposed of.

Approval of Disposal Sites

- Chemistry of the material was provided to determine if the proposed disposal facility (landfill) was permitted for acceptance.
- Water Security Agency and Ministry of Environment were informed about the situation and process. No concerns were raised about the approaches that had been taken place.



Questions?