

Staff Report

Report To: Operations Committee
Report From: Lara Widdifield, Director of Public Works and Engineering
Meeting Date: March 16, 2023
Report Code: OP-23-010
Subject: Walking Beam Flocculator Emergency Replacement

Recommendations:

THAT in consideration of Staff Report OP-23-010 respecting the Walking Beam Flocculator Emergency Replacement, the Operations Committee recommends that City Council receive the report for information purposes.

Highlights:

- On January 31, 2023, it was discovered that several suspension rods holding up one of the City's walking beam flocculators were damaged. One of the connection points snapped, causing catastrophic damage.
- Staff has drained the tank, and a local metal fabricator has begun to remove the wreckage. A quote for the replacement of the equipment is being sought.
- The City's water treatment plant has two identical walking beam flocculators, both original to the plant (circa the 1960s). There is partial redundancy within the plant's process via the two newer flocculators added in the early 1980s; however, not replacing the flocculator is not viable.
- Once the remediation costs and costs to replace the damaged flocculator are better known, Staff will submit a further report on logistics and financial impacts. It is prudent to consider also replacing the other walking beam flocculator of the same vintage.

Strategic Plan Alignment:

This report supports the delivery of Core Service.

Previous Report/Authority:

None.

Background:

The Owen Sound Water Treatment Plant was originally built in the 1960s. It was equipped with twin flocculation tanks coupled with filter tanks. Flocculators are used to remove fine particulate matter from the raw water. Those that have maintained a pool may be familiar with flocculation; a flocculant is added to the water to cause the fine particles to clump together, making them more accessible for the filters to remove. To ensure optimum dispersion of the flocculant and creation of the floc (the clumped-together particles), agitation is necessary. There are several flocculators, some that spin like paddle wheels, others that are impeller-like discs, but the type installed in the water plant's original part are called walking beam flocculators. They resemble an oil derrick with a main axle upon which two beams are mounted that rock back and forth like a seesaw, and the mixing paddle assemblies are suspended. As the beam rocks, the assemblies are lifted and lowered in the water column, creating turbulence and mixing the water.

On the morning of January 13th, a routine inspection revealed that during the night, one of the connection points of the paddle assembly of the walking beam flocculator in cell 1 had corroded through, causing the paddle assembly to swing underneath the assembly on the other side of the tank. This caused the paddle assemblies to crash and consequently twisted and snapped the support rods that kept the paddle assemblies suspended from the walking beams. As a result, the paddle assemblies now lie on the tank's floor, partially submerged and irretrievable without specialized confined space equipment. The tank and associated filter have been taken offline, and the water level has gradually drawn down to prepare for the remediation efforts.

Analysis:

At approximately 60 years of age, the walking beam flocculators are beyond their useful life. They have been repaired multiple times and should have

been in the capital forecast for replacement over a decade ago, if not longer. As a result, although this equipment failure should have been predicted, it is now an unbudgeted expense.

Staff have done their best to mitigate the impacts of the treatment cell being out of commission. They have also arranged for a local steel fabricator familiar with the plant to remove the wreckage, which must be removed with a davit arm-mounted hoist. The availability of such equipment is fortunate, as the plant's design did not incorporate convenient access to the bottom of the flocculation tanks; the under-deck access hatch is remote and requires deep horizontal penetration confined space entry, a situation that significantly increases the complexity of the operation. The davit arm hoist is in transit when writing this report. Upon arrival, it will be mounted to the concrete plant deck, and debris removal can begin.

Another corporation has succeeded the company that initially installed the walking beams, and Staff is hopeful that their archived files will contain the original schematics for the flocculators. Walking beam flocculators are still manufactured today and are considered the gold standard for floc production. However, it is anticipated that the flocculators are made-to-order and will likely have an extensive delivery time. As such, this cell is expected to be out of commission for several months at a minimum.

Staff considered installing a more readily available flocculator system, such as the type in cells 3 and 4. However, this would require an amendment to the Environmental Compliance Approval for the water plant, which would not significantly save time due to MECP review and processing timelines.

Further, in any decision tree, one must consider the "do nothing" approach. To this, Staff recommend that it is not a viable option to defer/decline the replacement for the following reasons:

- The second walking beam flocculator is identical in vintage and condition as the one that failed. There is a high probability that a similar failure could occur in the short term.
- Bearing in mind that a failure in the remaining walking beam is a distinct possibility and that the second and third flocculators are also aged at approximately 40 years old, the risk of a critical loss of redundancy, if not total filtration functionality, is significant.
- While the plant maintains adequate capacity under typical conditions with the elimination of cell 1, during wet-weather conditions such as spring thaw, the plant requires its total capacity

as the raw water supply typically bears more suspended sediment. The loss of one or more flocculators will impact the plant's functionality.

- The Capital Plan for 2023 already planned to temporarily take cells 3 and 4 out of service for a filter upgrade. That cannot be undertaken with cells 1 and 2 being non-functional.

Financial Implications:

The Director of Corporate Services has been consulted concerning the procurement process in emergencies and a discussion on the availability of funds in the Water Reserve to cover these unplanned expenses. The wreckage removal has begun; however, the costs for this remediation are challenging to predict and, as such, are proceeding on a time and materials cost basis. Once the remediation and subsequent replacement costs are known, verification of funding and approval as required under the Purchasing Policy shall be undertaken. As this is considered an emergency expense, Staff intends to proceed in the most economical manner possible; however, the replacement (and therefore expenditure) is unavoidable if the functionality of the water plant is to be maintained.

Communication Strategy:

There has not been, nor will there be, any impact on the quality or safety of the City's water due to this equipment failure. It is essential that any time this project is discussed, this fact be emphasized.

Consultation:

Staff have contacted the local Ministry of the Environment, Conservation and Parks team for guidance and to keep them apprised of our efforts to remedy the situation.

Attachments:

Walking Beam Flocculator Photos

Recommended by:

Lara Widdifield, Director of Public Works and Engineering

Submission approved by:

Tim Simmonds, City Manager

For more information on this report, please contact Lara Widdifield, Director of Public Works and Engineering, at lwiddifield@owensound.ca or 519-376-4440 ext. 1201.