



## Memorandum

**Memorandum No: 21-106**

**Date:** November 12, 2021

**To:** Honorable Mayor and Commissioners

**From:** Chris Lagerbloom, ICMA-CM, City Manager

**Re:** CHA/REISS Pilot Testing at Fiveash Water Treatment Plant

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### Scope and Goals

Public Works Engineering completed an eight-week pilot study with Reiss Engineering, Inc., a CHA Company (REISS), at the Fiveash Water Treatment Plant (Fiveash) to identify the feasibility of implementing advanced oxidation process (AOP) followed by biologically activated carbon (BAC), abbreviated AOP-BAC, to reduce the color of the finished water to a level undetectable to the human eye, which would be less than five color units (5 Pt-Units). Prior to the pilot being conducted, REISS predicted a 90% effluent water color removal by using AOP-BAC.

### Results Summary and Recommendations

- AOP alone removed 60% of the water color. The average effluent water color measured was 40 Pt-Units which was reduced to 16 Pt-Units after using AOP.
- CHA was unable to determine the change in water color following BAC use, as the secondary removal process failed. During testing, the BAC quickly became clogged with particle carry over resulting in the filter having to be backwashed frequently; therefore the 90% removal predicted was not achieved.
- The recommendation was made to perform another pilot to retrofit an existing filter at Fiveash with BAC to confirm its operability as a filtration media since this concept was not proven during this pilot. Reiss believes this may have a different result due to the increased size of the existing filter. Staff does not recommend this approach.
- Following the initial pilot Reiss is proposing two options, requiring additional equipment to the existing plant to lower the color of the effluent water:
  1. AOP-BAC
    - Capital Cost: \$171,445,000
    - Annual Operating Cost: \$22,700,000
    - Water Cost will increase: \$2.32/per thousand gallons

2. 50% Nano – 50% AOP-BAC

Capital Cost: \$263,400,000

Annual Operating Cost: \$19,800,000

Water Cost will increase: \$2.53 per thousand gallons

- In theory both options 1 and 2 (AOP-BAC and 50% Nano – 50% AOP-BAC) could be implemented to cover the 5-year gap, from now until a new plant facility is in operation, but BAC has not yet been proven to be a viable solution., Therefore, these options can't be considered at this point. If AOP is installed without BAC it will still require significant modifications to the existing treatment system and will only achieve 60% color removal. No cost estimate has been provided for AOP alone.
- Implementation of either option would be a minimum of three years.

### Conclusions

- If the options above were implemented, the existing cost of water would increase to approximately \$5.58 per thousand gallons for option 1 (based on the lowest tier (0-3000 gallons)) and \$5.79 per thousand gallons for option 2.
- No structural improvements have been contemplated in options 1 and 2 above, therefore Fiveash would not be rated for any future hurricanes Category-1 or above.
- It is assumed that \$30,000,000 plus any additional unforeseen repair/replacement costs would have to be spent every 5 years to keep Fiveash operational. most of the equipment is at the end of its useful life.
- The cost of water for a new state of the art water facility is estimated between \$2.75 and \$3.65 per thousand gallons.
- BAC was not proven to be a viable solution during this pilot.

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