CITY OF NEWARK
Mayor Ras J. Baraka

Department of Water and Sewer Utilities **A City We Can All Believe In**

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Mr. Steven Pudney, C.Eng., MICE
Section Chief - Engineering
Bureau of Water System Engineering
401 E. State Street
P.O. Box 420
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Subject: Newark Water Department – PWSID: NJ 0714001
Corrosion Control Treatment – [redacted] Rechlorination Station
Orthophosphate Update – Temporary Treatment Approval – WTA190001

Dear Mr. Pudney,

The Bureau of Water System Engineering (Bureau) provided a Temporary Treatment Approval to the City of Newark (City) for the Corrosion Control Treatment System at the [redacted] Rechlorination Station on April 25, 2019. Condition 7 in the permit required a status update on the zinc orthophosphate system commencing on August 1, 2019, with an update every quarter and a final report due by May 1, 2021 (per the extension granted on May 4, 2020) stating whether the zinc orthophosphate is effectively optimizing corrosion control treatment.

Orthophosphate and Distribution System Water Quality

On May 7, 2019 the zinc orthophosphate system at the [redacted] Rechlorination Station went into service with an initial dose of 0.5 mg/L as orthophosphate (PO4). As of October 3, 2019, the daily dose was approximately 2.75 mg/L as PO_4 according to the set point at the [redacted] Rechlorination Station and verifications by handheld analyzers and samples taken back to Newark's laboratory. As of January 2021, the target dose remains at 2.75 mg/L as PO_4 and the system has been working well since the last report dated November 2, 2020.

A SharePoint site has been set up to share water quality data in the distribution system with consecutive systems and the Bureau. Water quality in the distribution system is being recorded generally every weekday at the [redacted] Rechlorination Station and on a biweekly or monthly basis at the water quality parameter

(WQP) locations, depending on the parameter. Over the last 3 months, the following water quality observations have been made at the WQP locations:

- Manganese continues to stay low in the distribution system and was measured to be an average of 13.9 µg/L in November/early December 2020.
- Iron has increased slightly but remained low, maintaining an average of approximately 24.8 µg/L in November/early December 2020.
- Average turbidity was approximately 0.24 NTU in November/early December 2020.
- The orthophosphate residual in the system was an average of 2.80 mg/L as PO_4 in November and early December 2020, slightly above the target dose of 2.75 mg/L.

Permanent Orthophosphate Storage System

The zinc orthophosphate system installed in May 2019 continues to operate at the [redacted] Rechlorination Station. The "permanent" orthophosphate system will replace the existing outdoor tanks with tanks in underground vaults and add a day tank. This is necessary due to [redacted] zoning rules and the site constraints with the narrow site. The existing feed pumps, control panel and injector installed under the "temporary" system will remain in use. A new permit application will be submitted in early February 2021. Construction is anticipated to commence in the summer of 2021 with completion by the end of 2021. The temporary permit expires on July 31, 2021 for the existing tanks. The City of Newark requests an extension to the end of 2021 for the installation of the permanent tanks.

Lead and Copper Compliance Sampling

Lead and copper compliance sampling was completed for the second half of 2020. Reductions in lead levels continue, with the highest tap sample result being 27.0 ppb of the 136 samples collected for the pool. The 90th percentile on Water Watch is 13 ppb and there were 13 samples that exceeded the lead action level of 15 ppb.

Sequential Sampling

The final sequential sampling round was completed in December 2020. A table showing the sequential sampling that was performed between May 2019 and December 2020 is provided below in Table 1.

Table No. 1 – Sequential Sampling Sites (May 2019 – December 2020)

Address	Ward	Start Sampling	End Sampling	Notes
[redacted]	North Ward	May 2019	December 2020	Customer requested to stop sampling at end of 2020
[redacted]	West Ward	May 2019	December 2020	Customer requested to stop sampling at end of 2020
[redacted]	South Ward	May 2019	August 2020	Replaced when homeowner moved

Address	Ward	Start Sampling	End Sampling	Notes
[redacted]	West Ward	December 2019	November 2020	Customer requested to stop sampling at end of 2020
[redacted]	North Ward	January 2020	January 2020	1.5-inch line – removed from the study
[redacted]	South Ward	February 2020	February 2020	Owner concerned with COVID-19 and did not allow anyone to return for sampling

The sequential sampling program has been effective over the last 18 months in achieving the goal of providing information regarding the CCT implementation progress in the Pequannock gradient. Graphs showing the sequential sampling data over time at each home are included as Attachment No. 1. Based on the samples analyzed at the original three (3) homes ([redacted]), the soluble lead, defined as lead passing through a 0.45 um filter, has been reduced by over 95% in the peak lead samples compared with the baseline (i.e. before orthophosphate addition in May 2019). This is an indication that the orthophosphate is forming a scale and preventing soluble lead from leaching into the water from lead pipes and fixtures. The particulate lead values have also been reduced since the baseline samples, but not as much as the soluble lead. The source is suspected to be continued breakdown of any remaining tetravalent lead scales. Other studies have shown the orthophosphate scales typically form behind the tetravalent lead scales; thus the orthophosphate is not expected to prevent this phenomenon from occurring. Flushing and water usage can help accelerate the removal of the porous tetravalent lead scales. With Newark's rapid pace of LSL removal, it is anticipated that all LSLs will be removed before the tetravalent lead scales are completely gone. Newark will continue to distribute point-of-use filters and cartridges until all lead service lines are removed and for 6 months after a lead service line is replaced.

Scale Analysis

The following pipes were sent to the EPA for scale analysis on the dates listed below. The scale analysis results have been delayed due to COVID-19 restrictions and there is currently no schedule provided by the EPA.

- [redacted] – North Ward – Pequannock – removed 09/23/19
- [redacted] – East Ward – Wanaque – removed 11/27/19
- [redacted] – East Ward – Wanaque – removed 11/27/19
- [redacted] – West Ward – Pequannock – removed 2/19/20 - Scale in good condition – can harvest layers
- [redacted] – South Ward – Pequannock – removed 2/20/20 – Scale in good condition – can harvest layers
- [redacted] – South Ward – Pequannock – removed 2/20/20 – 1-inch pipe interior diameter, lots of sediment, can likely harvest layers
- [redacted] – West Ward - Pequannock – removed 2/24/20 – Scale damaged with cable tool
- [redacted] – South Ward – Pequannock – removed 7/27/20 – Scale damaged with cable tool
- [redacted] – Central Ward – Pequannock – removed 9/3/20 – Scale in good condition – can harvest layers
- [redacted] – East Ward – Wanaque – removed 9/3/20

- [redacted] – West Ward – Pequannock – removed 9/3/20 – Scale damaged with cable tool
- [redacted] - South Ward – Wanaque – removed 11/16/20
- [redacted] - South Ward - Wanaque – removed 11/17/20
- [redacted]- South Ward - Wanaque – removed 11/17/20
- [redacted] - West Ward - Pequannock - removed 11/17/20
- [redacted] - West Ward – Pequannock - removed 11/16/20
- [redacted] - West Ward – Pequannock - removed 11/17/20
- [redacted] - West Ward – Pequannock - removed 11/17/20
- [redacted] - West Ward – Pequannock - removed 11/17/20
- [redacted] - West Ward – Pequannock - removed 11/16/20
- [redacted] - West Ward – Pequannock - removed 11/16/20
- [redacted] - West Ward – Pequannock - removed 11/16/20

These pipes are currently being analyzed, however as stated above, some were damaged during the extraction and shipping process and will not be able to provide good information.

Pipe Loop and Additional Studies

Lastly, the pipe loop study finished the conditioning phase and started implemented orthophosphate in two of the racks (Rack 2 and Rack 3) on January 21, 2020. In May 2020, Rack 3 had silicate addition removed and lime added to study the impacts on water quality and lead release due to this change. There was no increase in the lead results after making this change. Small sections of pipe from the loop apparatus were removed and provided to NJIT to evaluate the changes to the scale from the conditioning phase and the study phase. The analysis was delayed due to researchers having limited access to the laboratory and the expected timeframe for the results pushed back from August 2020 to February 2021. On September 14, 2020, Rack 2 underwent the same change as Rack 3 – silicate was removed and replaced with lime to maintain the pH. Similar to Rack 3, this change from silicate to lime did not result in an increase in lead concentrations.

The most useful information remaining from the loop study is to analyze the scales on the pipes in the three (3) different racks to compare the minerology and stability of the scales. The City of Newark intends to stop running the pipe loop and analyze the scales after discussing and obtaining agreement from NJDEP.

Pequannock Township

It is Newark's intent to continue feeding sodium silicate until the Pequannock Township Water Department implements its corrosion control treatment or until approved by NJDEP based on the results of the pipe loop study indicating that there are no increases in lead levels after removing sodium silicate and increasing lime in Racks 2 and 3.

As always, please contact me with any questions.

Sincerely,

Kareem Adeem

Kareem Adeem
Director, Department of Water and Sewer Utilities
City of Newark

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