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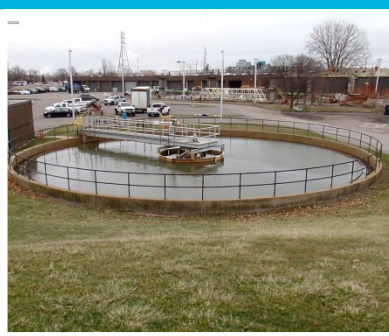
Q2 2019 Quarterly Progress Report
Niagara Falls Water Board
Order on Consent R9-20170906-129

Prepared for submission to:
New York State Department of Environmental Conservation Region 9
270 Michigan Avenue
Buffalo, New York 14203

Prepared by:
AECOM
257 West Genesee Street, Suite 400
Buffalo, New York 14202

July 31, 2019



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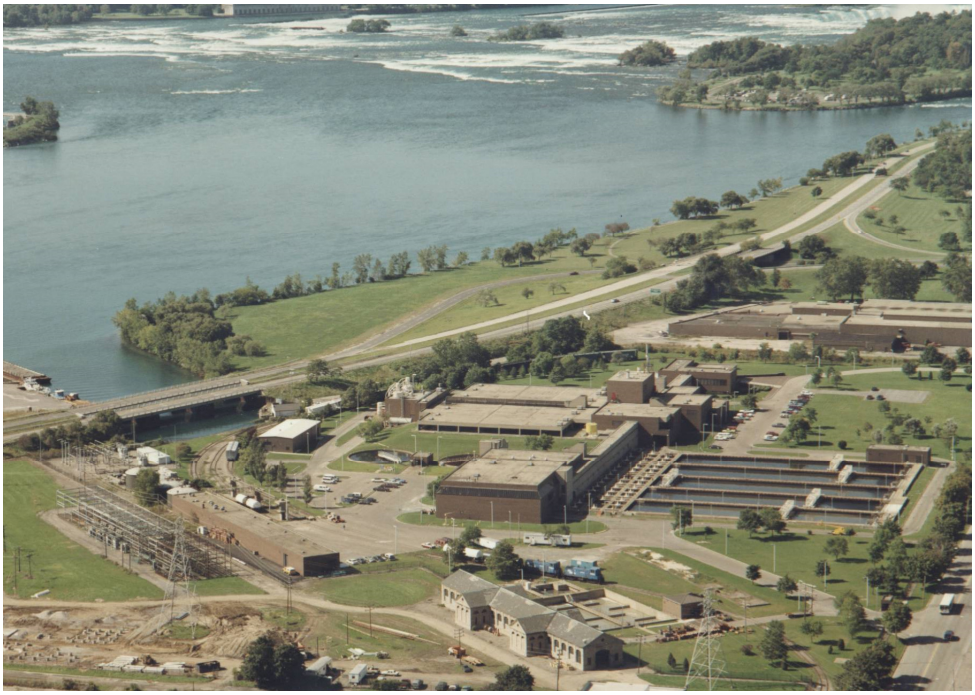

NIAGARA FALLS WATER BOARD

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Executive Summary

This document is the sixth required quarterly progress report for the Niagara Falls Water Board (NFWB) Order on Consent R9-20170906-129 (Consent Order) as required by Schedule A Item 15 of the Consent Order. This progress report covers the period from April 1, 2019 through June 30, 2019. The next quarterly progress report covering the period July 1, 2019 through September 30, 2019 is due October 31, 2019.

During the past quarter, the NFWB has properly operated the wastewater treatment plant (WWTP) and has met all State Pollution Discharge Elimination System (SPDES) permit requirements. Solids processing (settling, thickening, dewatering) during this period has functioned as intended. Primary effluent is clean (minimal suspended solids) which has allowed the WWTP's activated carbon filters to efficiently process the plant's influent flow. This quarter the plant transitioned from winter to summer mode, with wastewater temperatures rising from 49^{o}F to approximately 70^{o}F between April 1 and June 30. As the wastewater temperature rose, sulfide generation in the carbon filters increased, reaching approximately 10 mg/l by the end of the quarter. Dewatering throughput during this period has mostly kept up with incoming solids. The WWTP was operated free of significant odors during the past quarter.

Maintenance activities during the reporting period have been ongoing, and as of the end of the quarter major treatment systems and components are functional. The WWTP is undertaking a number of capital upgrades and improvements that are within the capability of the WWTP's maintenance staff and/or contractors awarded service contracts. In addition to the projects being undertaken by the WWTP's staff and outside contractors, project planning and design for $27 million in major capital upgrades are taking place. Contracts are in place for seven (7) of the nine (9) capital projects (Projects 1, 2, 3, 4, 5, 7 and 9) and one (1) of the capital projects is being undertaken by plant maintenance staff with assistance from an outside contractor under the mechanical services contract (Project 8). Portions of Project 6 related to effluent disinfection system upgrades are also underway.

The NFWB has met all scheduled requirements of the Consent Order as identified in Schedule A of the Consent Order. Specific submissions due during the past quarter that have been submitted include:

- The fifth quarterly report for the first of 2019 (Q1 2019) was submitted April 30, 2019 to the NYSDEC and posted on the NFWB's website (Consent Order Item 15).
- A capital projects plan was submitted to the NYSDEC in accordance with the June 19, 2019 deadline (Consent Order Item 18).

The NFWB is committed to working cooperatively and openly with the NYSDEC to improve the Niagara Falls WWTP and operate it to the best of its capability. To that end, we have continued to have an open dialogue with the NYSDEC through communications, meetings and discussions. During the past quarter, update meetings and discussions have been held between the NFWB and the NYSDEC on the following dates:

- May 7, 2019 Rob Locey inspection of Gorge Pumping Station to discuss the proposed work on the hydropneumatic tank and observe the hydropneumatic tank.

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1. WWTP Performance

This section discusses the operation of the NFWB WWTP during the reporting period of April 1, 2019 through June 30, 2019. In the following sections, Treatment Plant Operations, Solids Removal Performance, and Treatment Plant Equipment Readiness are discussed.

1.1 Treatment Plant Operations

Mr. Robert Dunn serves as the Chief Operator of the wastewater treatment plant. Until such time as Mr. Dunn achieves the necessary operator's license, Mr. Kenneth Maving (New York State 4A licensed Operator 7598) is serving as the licensed plant operator. Mr. Maving spends at least 4 hours per day on average at the facility on a Monday through Friday basis and assists Mr. Dunn with his duties. There continues to be an operator vacancy and the NFWB is in the process of interviewing to fill the vacant operator position.

The four (4) SOSs and the Chief Operator continue to be provided with individual training by Mr. Tim Lockhart (NYS Class 4A License Number 7816). During the reporting period there have not been any SPDES permit excursions. This makes a consecutive 18 month period with no SPDES permit excursions. Solids processing has generally kept up with the incoming solids, and equipment maintenance and repair activities have been conducted as promptly as possible.

During the past quarter, the WWTP transitioned from winter mode of operation to summer mode. Wastewater influent temperatures have risen from 49^{o}F to approximately 70^{o}F and sulfide concentrations exiting the filters have increased to the 5 to 10 mg/l range. With the increase in sulfide generation the sodium hypochlorite demand of the plant effluent has increased significantly. In addition, the practice of chlorinating the plant's primary effluent that was instituted on March 20, 2019 has continued. The practice of chlorinating primary effluent was able to eliminate sulfide generation in the carbon filters until wastewater temperatures exceeded approximately 60^{o}F. Below 60^{o}F there was only a minor amount (0 to 1 mg/l) of sulfide being generated in the carbon filters. Once wastewater temperature exceeds 60^{o}F sulfide began to be produced in low concentrations (1 – 3 mg/l). Over 65^{o}F the sulfide concentration is further increased to approximately 5 to 10 mg/l. At sulfide concentrations less than 1 to 3 mg/l effluent turbidity does not occur. However towards the end of Q2 2019, as sulfide levels exiting the filters exceeded 5 mg/l, effluent turbidity again began to occur.

Another significant development during this past quarter was that the color of Sedimentation Basin 5 continued to be straw/green colored with no dark tint developing. This is attributed to the prechlorination of filter influent along with the continued use of sodium hypochlorite during all filter backwashes. Another significant development is that prechlorination of filter influent is resulting in much longer filter run times. It is not uncommon to have filters run for 4 to 8 hours without the need for backwashing. As a result, the number of filter backwashes that occur during the course of

a dry weather day has been reduced from over 100 to approximately 20 to 30; and the amount of backwash water being delivered to Sedimentation Basin 5 has decreased tremendously.

1.2 Solids Removal Performance

A solids balance for April, May, and June 2019 is presented in Table 1. The data is based upon effluent flow meter measurements. The data shows that the amount of solids sent to the landfill was equal to the amount of influent solids minus effluent solids plus chemical usage (ferric chloride & lime) for the month of April. During May and June there was a reduction in the amount of sludge landfilled to 85% and 84%, respectively, which may be an indication of solids accumulation within the plant; however observations and sludge judge testing of the sedimentation basins do not indicate that excessive solids are being stored in the sedimentation basins.

1.3 Treatment Plant Equipment Readiness

During the reporting period there were several treatment plant equipment breakdowns that required maintenance staff to repair or replace the equipment. Significant equipment repairs this past quarter have included:

- A major power issue occurred on April 14, 2019 as a result of a lightning strike. The strike took out Power Center 3 (PC3) and also affected the high voltage underground feeders to Power Centers 4, 5, and 6. Ferguson Electric was brought in to perform immediate repairs and to connect emergency backup power to replace the damaged PC3. By the following day, all systems were operating normally. An evaluation was performed to determine the extent of damage and to assist in the filing of an insurance claim. As a result a number of items have been identified and prioritized for implementation. This work is currently underway and should be completed in Q4 2019.
- New belts were installed on Belt Filter Press #2. Hydraulic fluid and filters in all three (3) belt filter presses was changed. New drive gears were installed on BFP#3.
- Repairs made in the sedimentation basins included:
    - Sedimentation Basin number 4 had repairs made to the traveling bridge cables.
    - Sedimentation Basin number 4 had repairs made to the grit drive chain.

Although these repairs may have kept equipment out of service for brief periods of time during the past quarter, it has not significantly affected the plant performance. In general, a sufficient number of sedimentation basins with fully functional sludge removal equipment have been available to treat all incoming flows. Additionally, sufficient belt filter presses have been available for dewatering such that solids accumulation in the treatment plant has not occurred. As of the close of the second quarter of 2019, the following can be said regarding treatment equipment operability:

Table 1

NFWB WWTP Solids Balance

Month & Year	Average Daily Flow	Average Influent TSS	Average Effluent TSS	TSS Removed (Dry)	Ferric Chloride Added to Wastewater (Dry)	Lime Added to Sludge (Dry)	Total Solids (Dry) (TSS + Lime + Ferric)	Solids Content of Landfilled Sludge	Total Solids (Wet)	Solids Landfilled (DRY)	% Landfilled
	mgd	mg/l	mg/l	Tons/day	Tons/day	Tons/day	Tons/day	%	Tons/day	Tons/day	%
Apr-19	31.8	120	6.3	15.0	1.6	2.09	18.7	26.6%	70.3	18.8	100%
May-19	31.3	163	5.0	20.6	1.7	2.79	25.1	27.0%	92.9	21.4	85%
Jun-19	25.2	117	6.0	11.6	1.5	1.79	15.0	26.5%	56.5	12.64	84%

NOTES: mgd million gallons per day
TSS Total Suspended Solids
[1] % greater than or equal to 100 indicates all incoming solids plus all chemicals added are removed and sent to landfill.

- Four (4) Main Pumps are operational.
- Three (3) Intermediate Pumps (#2, #3, and #4) are operational. The #1 intermediate pump is inoperable and the pump is unable to be isolated due to an inoperable valve. A plan to assess this pump will be developed in the near future. NOTE – The WWTP has excess pump capacity in its Intermediate Pumping Station, and therefore immediate repairs to this pump are not critical.
- Sedimentation Basins 1 through 5 are functional and available for service with the following exceptions:
    - Sedimentation Basin #1 sludge screw motor and gear box required rebuilding. This required the basin to be taken off-line on June 20, 2019. Repairs are expected to be completed in Q3 2019. The basin can be used for wet weather treatment if absolutely necessary.
    - Sedimentation Basin #3 grit screw is out of service since January 22, 2019 and work is underway to repair it. The screw is scheduled to be replaced in its entirety along with the wall bearing. It is expected that the grit screw will be repaired in Q3 2019. In the meantime, the lack of a functional grit screw does not affect the plant performance or effluent quality. The basin continues to be used as needed for wet weather flow relief.
    - Sedimentation Basin 5 developed a problem with the grit screw that required the basin to be operated without a grit screw from 6/13/19 thorough the end of the quarter. The NYSDEC was notified of this issue. Repairs are expected to be completed in Q3 2019.

  During the past quarter, two (2) sedimentation basins have been used for flows up to 40 mgd, three (3) basins used for flows between 40 mgd and 60 mgd, and four (4) basins for flows over 60 mgd.
- Twenty eight (28) activated carbon filters are functional, although two carbon filters are in need of carbon replenishment and are only used during wet weather and only if necessary. These filters should be topped off with activated carbon in Q3 2019.
- The filter backwash system is functional including two backwash pumps and one new air scour blower/piping system.
- Three (3) belt filter presses are fully functional and capable of operating simultaneously, along with four (4) thickened sludge pumps, and three (3) polymer feed pumps (with spare polymer pump on the shelf).
- Two (2) pugmills, two (2) lime feed systems, and two (2) lime storage silos are fully functional.

2. Deliverables and Routine Communications

This section presents a listing and discussion of deliverables prepared by the NFWB for submission to the NYSDEC. In addition, other related written communications between the NYSDEC and the NFWB are also discussed.

2.1 Deliverables Status

Figure 1 presents a Microsoft Project schedule showing the status of all eighteen (18) items listed in the recently revised Schedule A of the Consent Order. The due date and the percent complete for each item is also listed in Figure 1. In the past quarter, the items listed in Table 2 were submitted to the NYSDEC to meet the Consent Order Schedule A requirements.

2.1.1 Pilot Scale Biological Treatment Systems

The two (2) pilot scale biological treatment systems continue to be operated by AECOM personnel. Extensive sample collection and analysis is being performed on influent, effluent, and in-process samples. The NYSDEC has requested and is receiving weekly data updates on both treatment systems via email. The two systems are:

- **Membrane BioReactor (MBR)** – Suez (formerly Zenon) 10 square foot pilot scale membrane biological reactor system complete with aerobic and anoxic biological treatment tanks.
- **Moving Bed BioReactor (MBBR)** – World Water Works moving bed bioreactor pilot plant with two aerobic vessels in series followed by a clarifier. The MBBR uses a dumped (loose) plastic media to support fixed film operation. The media fills approximately 1/3rd of the reactor volume, so there is also a suspended growth biomass component present.

The two pilot scale facilities will be operated through July 15, 2019, and the Alternative Treatment Technology evaluation report will be submitted October 31, 2019 (Consent Order Item 11 Part 2).

2.1.2 Existing WWTP Optimization Efforts

During the past quarter AECOM has been performing studies and evaluations related to Consent Order Items 6, 7, and 10. This work focuses on optimization of the existing physical chemical treatment facilities. The work is being performed in accordance with the NYSDEC approved work plan for this work. Briefly the work consists of:

Item 6 – Evaluate alternatives to the use of ferric chloride as a chemical coagulant.

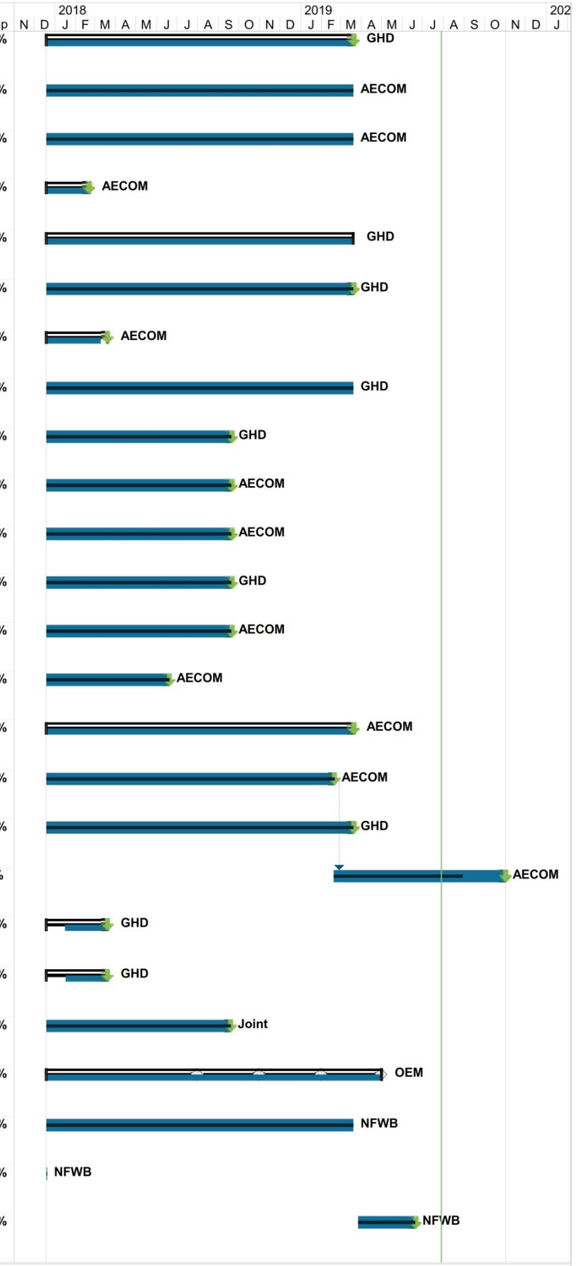
Item 7 – Evaluate Sedimentation Basin 5 processes for managing carbon filter backwash water.

Item 10 – Evaluate oxidizer use for preventing sulfide formation in the carbon filters.

This work is ongoing.

Figure 1
Consent Order Schedule Milestone Status

ID	Item No.	Task Name	Lead Firm	Support Firm	Duration	Start	Finish	Deadline	DEC Submittal Date	DEC Approval Date	% Comp
1	1	O&M Procedures & Documentation Submittals	GHD	AECOM	326 days	Tue 12/19/17	Tue 3/19/19	Tue 3/19/19	3/13/2019		100%
19	2	Operation as per Approved Plans	AECOM	NFWB	326 days	Tue 12/19/17	Tue 3/19/19	NA	2018-02-01	2018-03-15	100%
20	3	Sedimentation Basin Dewatering Procedures	AECOM	NFWB	326 days	Tue 12/19/17	Tue 3/19/19	NA	2018-02-01	2018-03-15	100%
21	4	Excess Solids Work Plan Submittal	AECOM	NFWB	45 days	Tue 12/19/17	Mon 2/19/18	Mon 2/19/18	2018-02-15	2018-03-15	100%
38	5	Improve Sedimentation Basin TB and C&F Reliability	GHD	AECOM	326 days	Tue 12/19/17	Tue 3/19/19	NA			100%
39	5a	Revise O&MM and SOP's related to Sedimentation Basin Repairs	GHD	AECOM	326 days	Tue 12/19/17	Tue 3/19/19	Tue 3/19/19	3/13/2019		100%
40	5b	Sludge Collection Equipment Damage Prevention Submittal	AECOM	GHD	65 days	Tue 12/19/17	Mon 3/19/18	Mon 3/19/18	2018-03-19		100%
44	5c	Suspend Sedimentation Basin Usage Upon Malfunction	GHD	AECOM	326 days	Tue 12/19/17	Tue 3/19/19	NA	2018-03-19		100%
45	5d	Recommendations for Equipment Improvement Submittal	GHD	AECOM	197 days	Tue 12/19/17	Wed 9/19/18	Wed 9/19/18	2018-09-18		100%
46	6	Ferric chloride Alternative Evaluation Work Plan Submittal	AECOM	GHD	197 days	Tue 12/19/17	Wed 9/19/18	Wed 9/19/18	2018-09-18	2019-01-09	100%
47	7	Sedimentation Basin 5 Alternative Evaluation Work Plan Submittal	AECOM	GHD	197 days	Tue 12/19/17	Wed 9/19/18	Wed 9/19/18	2018-09-18	2019-01-09	100%
48	8	WWOP Update Submittal	GHD	AECOM	197 days	Tue 12/19/17	Wed 9/19/18	Wed 9/19/18	2018-09-18		100%
49	9	Disinfection Improvement Recommendation Submittal	AECOM	GHD	197 days	Tue 12/19/17	Wed 9/19/18	Wed 9/19/18	2018-09-18	2019-01-09	100%
50	10	Carbon System Oxidizer Evaluation Work Plan Submittal	AECOM	GHD	131 days	Tue 12/19/17	Tue 6/19/18	Tue 6/19/18	2018-06-19	2019-01-09	100%
51	11	Treatment Process Alternative Report Submittal	AECOM	GHD	326 days	Tue 12/19/17	Tue 3/19/19	Tue 3/19/19			100%
52	11a.1	Treatment Process Alternative Evaluation - Part 1	AECOM	GHD	306 days	Tue 12/19/17	Tue 2/19/19	Tue 2/19/19	2019-02-19		100%
53	11b	Identify Upgrades Necessary for 95% & 97% Capture	GHD	AECOM	326 days	Tue 12/19/17	Tue 3/19/19	Tue 3/19/19	2019-03-18		100%
54	11a.2	Treatment Process Alternative Evaluation - Part 2	AECOM	GHD	183 days	Tue 2/19/19	Thu 10/31/19	Thu 10/31/19			75%
55	12	GPS & FST CSO and SSO Documentation Submittal	GHD	AECOM	65 days	Tue 12/19/17	Mon 3/19/18	Mon 3/19/18	2018-03-19		100%
59	13	NYAlert CSO & SSO Reporting Documentation Submittal	GHD	AECOM	65 days	Tue 12/19/17	Mon 3/19/18	Mon 3/19/18	2018-03-19		100%
63	14	Outfall 001 & 003 Relocation Evaluation Submittal	Joint	Joint	196 days	Tue 12/19/17	Tue 9/18/18	Tue 9/18/18	2018-09-18		100%
64	15	Quarterly Report Progress Submitals	OEM	Joint	356 days	Tue 12/19/17	Tue 4/30/19	NA			100%
75	16	Sedimentation Basin 5 Dewatering Restrictions	NFWB	GHD	326 days	Tue 12/19/17	Tue 3/19/19	NA			100%
76	17	Update Operating Plans & Staff Direction	NFWB	Joint	1 day	Tue 12/19/17	Tue 12/19/17	NA			100%
77	18	Work Plan and Schedule for Table 4.1 in July 24, 2018 Engineering Report	NFWB		61 days	Wed 3/27/19	Wed 6/19/19	Wed 6/19/19			100%



Project: NFWB Consent Order
Date: Mon 7/29/19

Summary Progress, Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Progress, Manual Progress

2.2 Deliverables Discussion

In addition to the above submittals prepared and submitted this past quarter, work is well underway on the following Consent order deliverables:

- Consent Order Item 11, Part 2.

2.3 Deliverables in Next Quarter

During the third quarter of 2019 (July 1, 2019 through September 30, 2019) there are no submittals (per Schedule A of the Consent Order) due to the NYSDEC.

2.4 Routine Communications in Past Quarter

During the past quarter the correspondence items listed in Table 3 were submitted to the NYSDEC by the NFWB. The written communications listed below in Table 4 were received from the NYSDEC during the reporting period.

2.5 Unresolved Issues/Delays

The NFWB is awaiting permission from the State of New York (DASNY and NYS Department of Budget) to use a portion of the Phase II DASNY funds ($850,000) to partially fund the Outfall 003 Relocation project. Various email communications between Rupp Baase and DASNY officials regarding this topic have occurred during the past quarter.

Table 2
NFWB Submissions to NYSDEC per Schedule A of the Consent Order

Date	Prepared By	Consent Order Schedule A Items	Comment
April 30, 2019	AECOM	Item 15	Q1 2019 Progress Report
June 19, 2019	CPL	Item 18	Capital projects plan

Table 3
NFWB Communications to NYSDEC

Date	Prepared By	Purpose
Various	NFWB Clayton Hotchkiss	Communications regarding Gorge Pumping Station shutdown to facilitate repairs to the hydropneumatic tank.
May 15, 2019	NFWB Robert Dunn	Email providing notification that the repairs to the hydropneumatic tank at the Gorge Pumping Station were completed.

Table 4
Communications Received from NYSDEC

Date	Delivered To	Purpose
May 8, 2019	NFWB	Email from Rob Locey approving shut down and repair of the hydropneumatic tank at the Gorge Pumping Station.
May 15, 2019	NFWB	Letter regarding relocation of Outfall 003 to from the Falls Street Tunnel to the Gorge Pumping Station.
June 12, 2019	NFWB	Letter regarding relocation of Outfall 003 to from the Falls Street Tunnel to the Gorge Pumping Station.

3. Capital Improvement Program

In this section, progress on WWTP capital upgrades is discussed. Capital upgrades are proceeding on several fronts. Projects that are within the capability of in-house maintenance staff are being undertaken as quickly as possible. Additionally, outside contractors selected for WWTP work (Mechanical Contractor – Mollenberg Betz, Electrical Contractor – Ferguson Electric) are being utilized for larger projects. Lastly, design is underway to perform a number of capital upgrades that are necessary to stabilize the operation of the existing treatment plant. Each of these items is discussed in this section.

3.1 In-House Capital Upgrades Completed/Underway

This category of projects includes work being undertaken by plant maintenance staff or outside contractors without the need for extensive design and engineering documents. This work is generally considered repair and/or replace in kind and therefore NYSDEC approval is not generally required prior to performing the work. During the past quarter, the following projects are proceeding and/or were completed:

- **Traveling Bridge Rack and Rail Improvements –** Operation of the traveling bridges is becoming increasingly difficult due to a number of issues including the rack, rail, and hold down hardware. There are a number of places where rail splices are loose, rack mounts are bent, and rail mounting hardware is out of tolerance. Materials (nuts, bolts, hardware) have been purchased and are at the plant. One sedimentation basin will be upgraded and the results monitored before a decision is made whether to proceed with additional basins. This work is expected to occur in Q3 2019.
- **Gorge Pumping Station Hydropneumatic Tank Refurbishment –** A number of repairs to the hydropneumatic tank that serves as a surge arrestor on the Gorge Force Main were performed. Repairs included: replacement of the 16” isolation gate valve and replacement of the level sensor stilling well isolation valves. Now that these repairs have been completed, repairs/replacement of the level sensors in the stilling well and other related tank-mounted controls can proceed. The remaining work is expected to occur in Q3 2019.
- **Effluent Disinfection –** Work has begun on the installation of piping and equipment for effluent disinfection. This has included demolition of existing unused chlorine solution piping and the beginning of pipe installation to bring sodium hypochlorite from the chemical feed area to the chlorine contact tank. All work completed thus far was performed by in-house Maintenance staff.
- **Check Valves and Pressure Gauges in Sludge Pump Gallery -** NFWB Maintenance staff replaced check valves in the pump gallery on the two grit pumps servicing the Rapid Mix Tanks. The work includes check valve replacement along with installation of a pressure gauge (discharge pressure) in an isolation diaphragm/ring. The existing check valves were original (40 years old) and were in need of replacement. It is expected that the pressure gauge will improve plant operations and maintenance capabilities.
- **Odor Control Scrubber Blowdown Piping -** Piping was installed to direct the odor control scrubber blow down piping to the carbon bed effluent wet well.

- **Demolition of Unused Facilities -** The large chemical bulk storage tanks adjacent to the Outside Sewer Maintenance garage were demolished during this past quarter. These tanks have not been used in quite some time.
- **Air Scour Blower Rebuild –** Work continues on the rebuild and installation of the second air scour blower. This work constitutes Project 8 of the capital projects and will be done using in-house staff and the Maintenance service contract (Mollenberg-Betz). The blower (remanufactured) and motor (rebuilt) have been returned to the facility mounted and aligned on the blower stand (sandblasted and painted). In addition, the pressure release valve and pressure control valve have been rebuilt and returned to the facility. The NFWB has purchased necessary appurtenances, instruments and controls including: high temperature and high pressure protective switches, a check valve, and an electric actuated unloader valve. As of the end of Q2 2019, Mollenberg Betz has mobilized to begin system installation including the installation of the blower, new silencer, air piping, instrumentation piping, and all appurtenances and controls. The work is expected to be complete during Q3 2019.

3.2 Capital Improvement Projects

A document titled NFWB Wastewater Treatment Plant and Gorge Pump Station Rehabilitation Workplan and Design Schedule prepared by CPL Team was submitted to the NYSDEC in accordance with Consent Order Item 18 on June 19, 2019 and should be consulted for information regarding proposed Capital Improvements Projects.