Onondaga County Department of
WATER ENVIRONMENT PROTECTION

Brewerton
Water Pollution Control Plant

Wet Weather Operating Plan

May 2013

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Section 1 – Introduction and Overview

This *Wet Weather Operating Plan* has been prepared to assist in meeting the requirements of the New York State Pollutant Discharge Elimination System (SPDES) permit (No. NY0027596) for the Brewerton Water Pollution Control Plant (Brewerton). The Brewerton WPCP has a design flow of 3.0 MGD and provides advanced secondary treatment of wastewater using either Extended Aeration or Contact Stabilization Activated Sludge Processes. Construction of this facility was completed in 1974, and the treatment plant is currently operated using the Extended Aeration process. Wastewater is collected throughout portions of the Town of Cicero; along the Southwest edge of Oneida Lake, beginning just west of the Hamlet of Bridgeport, up to and including the Village of Brewerton. Wastewater collected from various neighborhoods is transported via a series of pumping stations, which connect to either the Lakeshore or Orangeport trunk sewers. These two trunk sewers gravity feed to and combine at Special Manhole No. 1, located immediately to the East of the Raw Sewage Pumping Station (RSPS) structure. The wastewater influent is primarily from residential sources.

The wastewater undergoes screening and grit removal in the RSPS, utilizing both a bar rack and a mechanical screen rake, followed by grit removal in an aerated grit chamber, which uses a mechanical clam shell removal system. Wastewater is then pumped and spilt between two (2) treatment trains, North and South, to begin the activated sludge treatment process using a three (3) tank system in the Extended Aeration mode. The split wastewater is diverted into the first of two (2) sludge reaeration tanks in series as plug flow. The wastewater flows through the reaeration tanks to the aerated mixed liquor tank for extended activated sludge treatment. Return activated sludge (RAS) is step fed into the two (2) reaeration tanks with approximately 50% of the (RAS) being pumped back to the influent end of the first reaeration tank, where it is mixed with the incoming wastewater. In addition, the first reaeration tank also receives an additional 25% of the RAS on the effluent end. The second reaeration tank receives the remaining 25 % of the RAS on the effluent end just before the inlet of aerated mixed liquor tank inlet. The treated wastewater then flows to the final clarifier where settling occurs with the aid of cationic polymer. Activated sludge collected in the clarifier is recirculated to the sludge reaeration tank and/or wasted to the two (2) aerobic digestion tanks which operate in series. Digested sludge is thickened using a rotary drum thickener, stored in a concentration tank and hauled to the Metropolitan-Syracuse WWTP for further treatment. Effluent from the clarifier flows to the chlorine contact tank for seasonal disinfection using sodium hypochlorite before discharge to the Oneida River. Total Phosphorus is removed year round with the use of ferrous sulfate. Seasonal nitrification is related to ambient temperatures.

- *Plant Bypass* – Brewerton WPCP has **no** capability to bypass flows around the treatment facility, all influent wastewater flows through the treatment process.

Performance Goals

The overall goal of the wet weather operating plan is to provide the best possible treatment to high flows in an effort to maintain SPDES compliance, minimize the impact of high flows on the treatment process and to resume full treatment quickly as wet weather conditions abate.

- Maintain SPDES compliance.
- Minimize impact on treatment process units.
- Return facility to full treatment capabilities as soon as possible.

Utilization of the Manual

The purpose of this manual is to provide a set of operating guidelines to assist the Brewerton WPCP and collection system staff in making operational decisions which will best meet the performance goals and the requirements of the SPDES discharge permit.

During a wet weather event, numerous operational decisions must be made to effectively manage high influent wastewater flow into the Brewerton WPCP. Multiple control structures, varying conditions of the treatment processes, equipment service status and varying degrees of intensity and duration of the storm/snowmelt make each event and the reactive operational strategy potentially unique. No manual can describe the decision making process for every possible operating scenario. However, this manual will serve as a useful reference for both new and experienced operators to utilize during wet weather events. Covered specifically are preparations for a pending wet weather event, strategies for processes control during the event and a checklist of critical steps involved to monitor and control processes during an event.

This manual is designed to allow use as a quick reference during wet weather events. It is broken down into sections which cover major unit processes at the Brewerton facility. Each section includes the following information:

- Operational Description – Overview of the designated treatment process and associated equipment.
- Pre-Wet Weather Event Activities – Activities to be performed in anticipation of pending wet-weather event.
- During Wet Weather Activities – Major activities to be performed during the wet-weather event.
- Post Wet Weather Activities – Activities to be performed following the wet weather event, and in anticipation of future events.

This manual is a living document. Users of the manual are encouraged to identify new steps, procedures, and recommendations to improve the overall utility of the manual. All recommendations shall be submitted to the user's immediate supervisor for consideration for inclusion in the manual.

Section 2 - Wet Weather Operational Conditions and Strategy

a. Wet Weather Operation Condition No. 1

This occurs when Operations Staff is able to anticipate wet weather flows or when high flows occur, proceed as follows:

1. Open the inlet gates to the chlorine contact tanks to at least 2.5 feet.
2. Open the inlet gates to the clarifiers 30 full turns each.
3. Maintain current Return Activated Sludge (RAS) rates.
4. Maintain current polymer feed rate.
5. Maintain current Ferrous Sulfate feed rate.
6. Monitor chlorine residuals and adjust accordingly.

b. Wet Weather Operation Condition No. 2

After Wet Weather Operation Condition No.1 has been completed and total plant influent flow reaches 4 MGD, proceed as follows:

1. Pull screenings off the manual bar rack as often as needed.
2. Shut off the Waste Activated Sludge (WAS) flow for both sides of the plant.
3. Do not decant the aerobic digester.
4. Do not hose clarifier weirs or chlorine contact tank, hosing can be done another day.
5. Monitor chlorine residuals and adjust accordingly.

c. Wet Weather Operation Condition No. 3

After Wet Weather Operation Condition No.1 and No.2 have been completed and total plant influent flow reaches 4.2 MGD, proceed as follows:

1. Change activated sludge process operation from Extended Aeration (Normal Operation) to Contact Stabilization (High Flow Operation). This is accomplished by opening both North and South train influent valves (No.3) and then closing valves (No.2) located at the bottom of the chemical building stairs.
2. Turn up process air for MLSS Aeration Tanks to 600cfm (computer maximum), wait 30 minutes and then monitor Dissolved Oxygen on all Aeration Tanks. Maintain a Dissolved Oxygen of 2.5 mg/L or greater in all tanks. Re-check Aeration Tanks one (1) hour later.

d. Wet Weather Operation Condition No. 4

After Wet Weather Operation Condition No.1, No.2 and No.3 have been completed and total plant influent flow reaches 5.0 MGD, proceed as follows:

1. Shut off Process Air to the Grit Chamber in the Headwork's building.
2. Shut off the Process Air to the North and South Reaeration Tanks.
3. Conduct a plant check every hour to ensure proper operation, continue until flows return to 4.3 MGD.
4. As flows decrease, on a downward trend, follow steps in reverse order, if the plant influent flows begin to approach 3.5 MGD, return Activated Sludge Process to Extended Aeration Operation.

Section 3 – Unit Process Wet Weather Operation

In general, prior to any wet weather events, the operational staff monitors storm development via internet access to assist in predicting the onset of a wet weather event. This allows both the head operator and operator(s) the ability to review the personnel roster to ensure adequate staff is available and call in additional personnel as required. In addition, the monitoring of storm development allows the operational and maintenance staff to begin pre-wet weather activities as identified herein.

At this time, the Department does not have a policy, mechanism or corresponding procedure for issuing wet weather related advisories to the municipalities that discharge to the County's collection system.

a. Screenings and Grit Removal - Raw Sewage Pumping Station (RSPS)

The screenings and grit removal occurs in the RSPS which receives wastewater from two (2) gravity trunk sewers, which combine at Manhole No.1 prior to entering the RSPS. Wastewater enters the RSPS where it flows through an automated mechanical screen rake. The wastewater then flows into one (1) aerated grit chamber. Grit removal is accomplished by turning off the Process Air and using a clam shell device to scoop out settled grit. Collected grit is deposited into 4 cubic yard containers.

Wastewater is pumped to the Aeration Tanks, via three (3) influent pumps (Lead, Lag 1, and Lag 2) located in an adjacent dry well. When in the automatic mode of operation, the pump operation depends on the wastewater level in the wet well. Wet well set point is 3.0 feet, one (1) pump (Lead) is always running and is typically sufficient to handle plant design flow.

During Wet Weather Activities

- *Wet Weather Condition No.1* - Automated screen rake may be put in 'Hand-Continual Run" mode to avoid channel back-up during high flows. If flooding of the wet well area is likely, the screen rake may be shut down.
- *Wet Weather Condition No.2 and No.3* – Pull screenings off the manual bar rack as often as needed.
- *Wet Weather Condition No.4* – Shut off process air to the Grit Chamber.
- When in the automatic mode of operation, the pump operation depends on the wastewater level in the wet well. Any combination of the three (3) influent pumps may be used as needed, depending on the wet well level and flow rate.

If the Lead Influent Raw Sewage pump is not sufficient to maintain the wet well set point at 3.0 feet, a second pump (Lag 1) is activated. Generally, this occurs when the Lead pump has run at full speed (60 HZ) and has not maintained a set point of 3.5 feet. If these two pumps pump are not sufficient to maintain the wet well set point and the well

continues to rise beyond a preset level (3.5 feet), a third pump (Lag 2) will be activated. If this is sufficient to meet or exceed the incoming flow rate, the well will begin to pump down. When the wet well descends to a preset level (2.5 feet) the Lag 2 pump is signaled to shut down.

Post Wet Weather Activities

- Return all equipment to dry weather operation.

b. Activated Sludge Treatment – Aeration Tanks

Under normal operating conditions, wastewater is split evenly between the North and the South Aeration Trains, where the activated sludge process is accomplished using Extended Aeration (Normal Operation). Valves and sluice gates in the distribution system allow for control or isolation of flow to either Aeration Train. Ferrous Sulfate dosing (for phosphorus removal) is injected into the Aeration Train Influent pipes. Dosing concentration is adjusted as needed and feed rate is flow paced and will increase as flows increase. A limit has been set on this system to pump no more than 245 GPD, regardless of flow rates.

During Wet Weather Activities

- *Wet Weather Condition No. 1* – Maintain current aeration, Ferrous Sulfate dosing and polymer dosing as needed. Maintain RAS rates.
- *Wet Weather Condition No. 2* – Shut off the WAS flow for both North and South Trains. Do not decant the Digester.
- *Wet Weather Condition No. 3* – Change plant operation from Extended Aeration Activated Sludge Process to the Contact Stabilization Process. Turn up process air to maximum (600 cfm). Maintain Dissolved Oxygen of 2.5 mg/L, check hourly.
- *Wet Weather Condition No. 4* – Shut down the process air to the Aeration Tanks as indicated based on flow rates and weather conditions.

Post Wet Weather Activities

- Return process air to the Aeration Tanks as indicated based on flow rates and weather conditions. Re-adjust process air and return process to Extended Aeration. Re-start WAS as needed. Return all equipment to dry weather operation.

c. Final Clarifier Treatment System

Aeration Tank Mixed Liquor is fed via a channel by gravity to the center of the respective circular clarifiers, up into the center stilling well and ported to the tank near the surface. Settled activated sludge is collected and drawn from the clarifier via differential pressure tubes affixed to the lower collector. The sludge is either returned by four (4) RAS pumps

to the aeration basin or to two (2) digesters where it is wasted. Skimmer arms collect and channel floatable materials into a trough/pit system for later disposal. Treated/clarified water flows over a peripheral-mounted v-notch weir/lauder and channeled to each tanks effluent collection box. Sodium Hypochlorite, during the disinfection season, is injected into either Tank No. 1's or tank 2's effluent collection box. The Sodium Hypochlorite feed is switched daily to either tank 1 or tank 2. The mixed discharge from the collection box is gravity fed to the Chlorine Contact Tank distribution structure.

During Wet Weather Activities

- Open inlet gates to the Final Clarifiers 30 full turns each.
- As needed, increase sludge withdrawal rates of Waste Activated Sludge (WAS).
- Increase performance monitoring (sludge depth gauging and visual observation).

d. Chlorine Contact Disinfection System

The Chlorine Contact Disinfection System receives treated effluent from the Final Clarifiers. The clarifier effluent gravity flows into the contact tank distribution box where it is split into two (2) parallel contact tanks. Sodium Hypochlorite is introduced via flow paced feed for the purpose of disinfection of the final effluent. The disinfection system consists of a chemical transfer system, chemical storage and containment system and a chemical feed building. Disinfection is required seasonally from May 15 to October 15. The plant effluent water system uses chlorinated water (during disinfection season) drawn from the contact tank outfall, this water is used for various activities by operations staff.

During Wet Weather Activities

- Open the inlet gates to the chlorine contact tanks to at least 2.5 feet.
- Administer Sodium Hypochlorite for chlorination and monitor the disinfection system for proper operation.

e. Sludge Handling Facilities

Waste Activated Sludge (WAS) is collected from the clarifiers and pumped to the Aerated digesters. The WAS is stored and aerated until it is then thickened in a Rotary Drum Thickener. Thickened sludge is then hauled via tanker truck to the Metropolitan-Syracuse WWTP for further treatment.

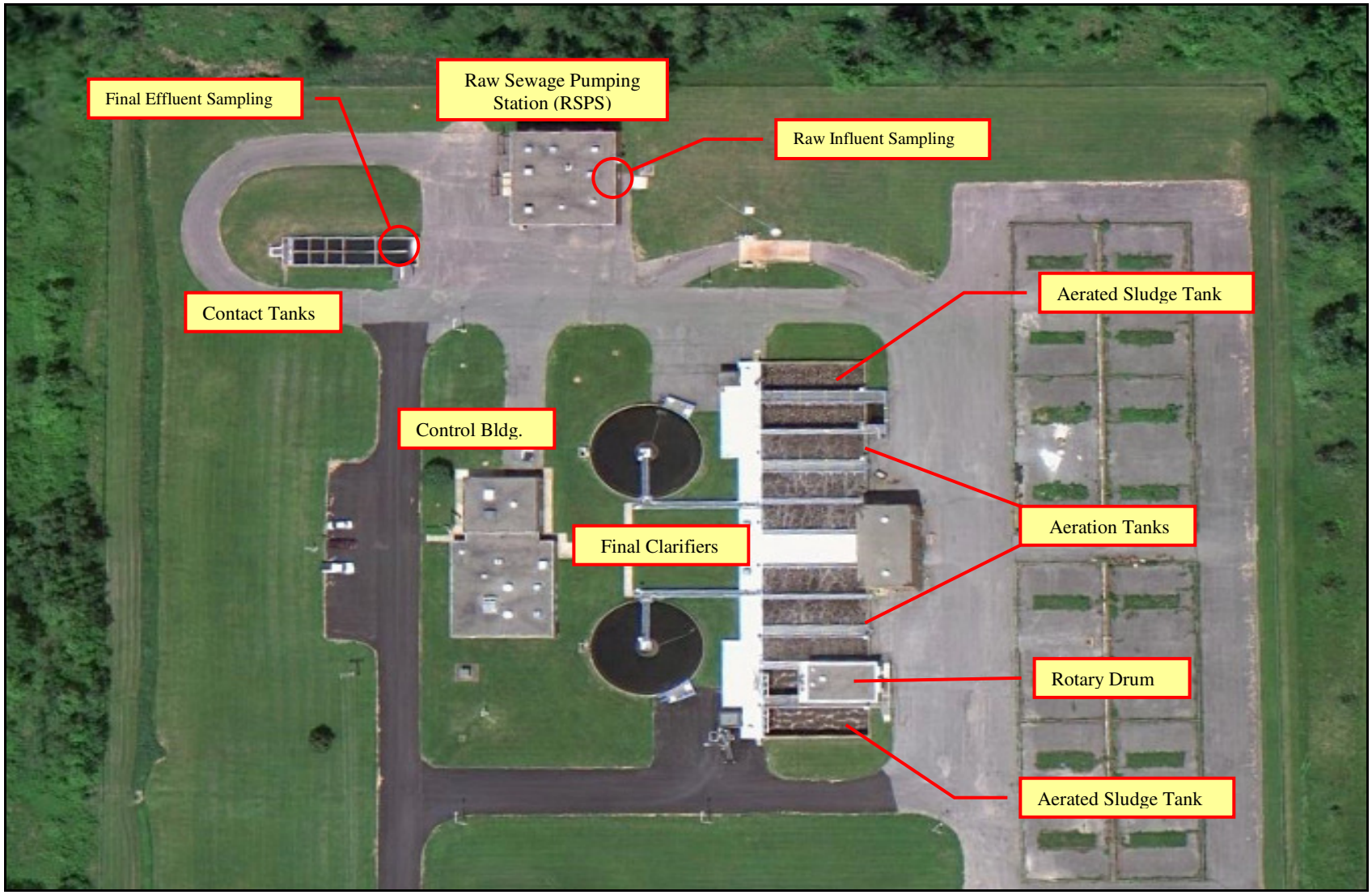
During Wet Weather Activities

- Do not decant digesters or run the rotary drum thickener as these activities cause additional flow to the head of the plant.

Appendix A

Brewerton WPCP

Site Plan - Process Units and Sampling Locations



APPENDIX B - BREWERTON HIGH FLOW CHECKLIST

Our goal during wet weather flows is Maintain SPDES Permit compliance by preventing solids from leaving the plant and entering the receiving waters.

Check the South chlorine contact tank drain, drain may be open up to 6 turns during dry weather conditions.

When We Are Able To Anticipate Wet Weather Flows, Or When High Flows Occur:

- Open the inlet gates to the chlorine contact tanks to at least 2.5 feet.
- Open the inlet gates to the clarifiers 30 full turns each.
- Maintain current RAS rates.
- Maintain current polymer feed rate.
- Maintain current Ferrous Sulfate feed rate.

When Total Plant Flow Reaches 4 MGD:

- Pull screenings off the manual bar rack as often as needed.
- Shut off the waste sludge flow for both sides.
- Do not decant the digester.
- Do not hose clarifier weirs or chlorine contact tank, hosing can be done another day.

When Total Flow Reaches 4.2 MGD:

- Change plant from our normal operation (Extended Air) to Contact Stabilization. This can be accomplished by opening both North and South train influent valves (#3) and then closing valves (#2) located at bottom of chemical building stairs.
- Turn up air for MLSS tanks to 600 cfm (computer max), wait 30 minutes and do DO's on all aeration tanks, maintain a DO of 2.5 mg/l or greater in all tanks. Recheck tanks 1 hour later.

When Total Flow Reaches 5 MGD:

- Shut off air to Grit chamber.
- Shut off air to North and South Reaeration tanks.

Do a plant check each hour to ensure everything is OK. Continue to monitor the plant until flows drop to 4.3 MGD. Follow the above instructions in reverse order as the flows return to normal. Switch the plant back to Extended air if you think the flow will return and stay down under 3.5 MGD.

This checklist is a reminder, it is not intended to be all-inclusive, if something does not look correct, contact the Head Operator.