



Tighe&Bond

Engineers | Environmental Specialists



A PHOENIX FROM THE ASHES

THE FALL AND RISE OF THE GREENFIELDS WWTP

NEWEA Annual Conference
January 2022

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GREENFIELDS WWTP CONDITION



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GREENFIELDS WWTP CONDITION

- 132,000 gpd
- 1963 Construction
- 170 Service Connections
- Built & operated by Housing Developer
- Owned & Operated by Town of Hyde Park



DUTCHESS COUNTY WATER & WW AUTHORITY

- **Public Benefit Corporation Est. 1991**
- **Goal: Address fragmentation and inefficiency in water and wastewater infrastructure in Dutchess County**
- **Own & Operate 18 water systems, 8 wastewater systems and 1 water transmission main**



PROJECT TIMELINE

- **2016 - Ownership Transfer Completed**
- **2017 - Tighe & Bond Design Complete**
- **2018 – Regulatory Approval**
- **2019 – Funding Obtained, Construction Bid**
- **Winter 2020 – Bid Awarded**
- **Summer 2020 – Contractor to Mobilize**

GREENFIELDS HAS A BAD DAY

DAILY FREEMAN

Hyde Park fire destroys sewer treatment plant building

Mid-Hudson News Network Jun 27, 2020 Comments



GREENFIELDS HAS A BAD DAY



GREENFIELDS WWTP REPLACEMENT SCOPE



GREENFIELDS WWTP REPLACEMENT SCOPE

- **Primary Clarifier – OK!**
- **Sludge Air Lift - Gone**



GREENFIELDS WWTP REPLACEMENT SCOPE



GREENFIELDS WWTP REPLACEMENT SCOPE

- RBCs – Gone



GREENFIELDS WWTP REPLACEMENT SCOPE

- **Secondary Clarifiers – OK?**
- **Sludge Air Lift - Gone**



GREENFIELDS WWTP REPLACEMENT SCOPE



GREENFIELDS WWTP REPLACEMENT SCOPE

- **Blowers – Gone**
- **Disinfection Chemical Feed – Gone**



EMERGENCY REPOSENSE BRAINSTORMING

- **Can we convert to an activated sludge plant?**
- **What dosage do we need for enhanced coagulation?**
- **Where do we get rental equipment? What should we size it for?**
- **Can we use sand filters for secondary treatment?**

EMERGENCY RESPONSE STEPS TAKEN

- **Protect public health**
 - Restore disinfection
- **Protect environmental health**
 - Restore post aeration
- **Provide increased treatment**
 - Enhanced coagulation

CALL NYSDEC!!



Temporary blower

Disinfection

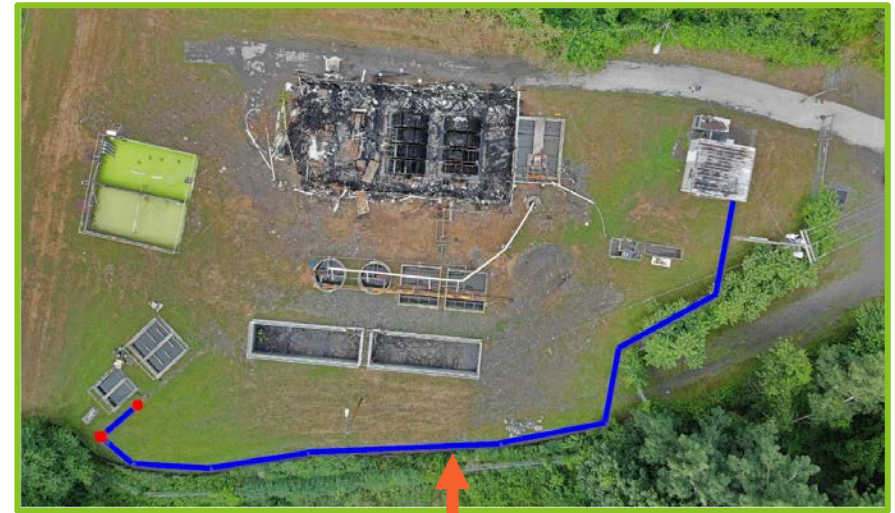
PROTECTION OF PUBLIC HEALTH

- **Restoration of sodium hypochlorite disinfection effluent dosing = first and highest priority.**
 - Dosing pumps and sodium hypochlorite sourced from supplies at other facilities.
 - Disinfection restored within hours.



PROTECTION OF ENVIRONMENTAL HEALTH

- **Restoration of post aeration was the second priority.**
 - Tighe & Bond sized the replacement blower and located a local supplier to provide a blower quickly.
 - Temporary power for the blower was coordinated through the Electrical Contractor. This required extending power to the far end of the site and procurement of a compatible VFD, which delayed restoration of the post aeration.
 - Post aeration was restored 28 days after the fire.



Routing of temporary electric service

PROVIDE INCREASED TREATMENT

- **Restoration of treatment capabilities was the third priority.**

- Coagulant vendor representative visited site to test different coagulants. Jar testing was conducted, and a coagulant type and dose selected.
- Recommended coagulant and dose:
25 uL/L of Surfloc C-3000
- Enhanced coagulation was begun 21 days after the fire.



COAGULANT JAR TEST RESULTS



Surpass Chemical

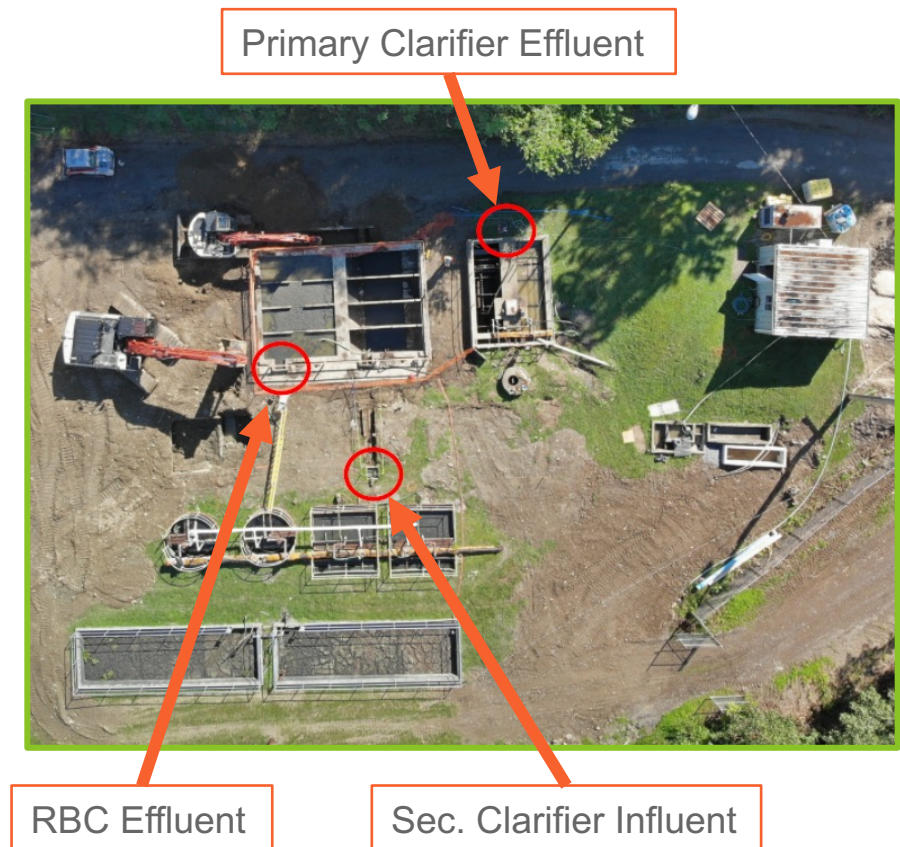
Jar Test Report

Location	Greenfields - Dutchess County											
Date	7/1/2020											
Application	Settling solids post RBC's burning down.											
Site Specifics	Settling solids in secondary clarifier											
Purpose of visit	Evaluate a product that can help meet discharge limits.											
Product	1	2	3	4	5	6	7	8	9	10	11	12
Dose (ul)	blank	108	108	108	Alum	300	300	3000	3000			
Turbidity (NTU)		20	40	60	80	15	30	15	25			
Comments	101	79	34	20.9	41	61	22.7	45.1	21.2			
Site Contact	Noted Surfloc C-3000 produced the best floc formation at the least cost to treat.											
Surpass Contact	We suggest a full scale trial of one tote of Surfloc C-3000.											
Site Contact	Rich Winchester, Jonathan Churins DCWWA											
Surpass Contact	Tim Clayton - Surpass Chemical											

ENHANCED COAGULATION DOSING LOCATIONS

- **Major decision: At what point in the treatment process to dose the coagulant?**

- Locations discussed included Primary Clarifier effluent, RBC effluent, and Secondary Clarifier influent.
- Primary clarifier dosing would result in settling in the RBC tanks, which are not design for efficient solids removal.
- Dosing was done at the RBC effluent and Secondary Clarifier influent, depending on what construction activities were occurring.



CHALLENGES TO MAINTAIN COAGULANT

- **Freezing**

- Coagulant needs to be maintained above 10°F
- No space to store inside
- Many layers of coverings and heater

- **Carrier Water**

- Added later to ensure dosed coagulant entered each clarifier
- Ensured coagulant did not freeze in tubing

- **Accidental Damage**

- Tubing pinched or cut
- Tubing pulled out of dose location
- Extension cords for dose pump and heater unplugged



SAND FILTERS AS SECONDARY TREATMENT

- **Prior to fire used as polishing filters**
- **Able to provide some physical filtration**
- **Biologic growth within sand media provides additional treatment**
- **Increased maintenance and decreased time each filter can be in service**



FOULING OF SAND FILTERS

- **Solids accumulation**

- Lack of upstream secondary treatment resulted in increased solids in sand filter influent.
- Solids captured have clogged sand media.

- **Decreased service time**

- Once clogged, sand filters do not pass flow quickly enough to avoid overtopping.
- Sand filters in service from 2-6 weeks.
- Prior to fire in service for up to 6 months.

- **Increased maintenance**

- Prior maintenance was removal of plant growth from surface during extended down time.
- New maintenance is removal of solids accumulating on sand surface.
- Solids removal also removes sand media and has reduced the depth of sand layer.

- **Restoration**

- Due to fouling, the sand filters are again part of the project, with a reduced rehab scope.



IMPACTS ON EFFLUENT QUALITY

- **Prior to the fire the plant was meeting permit requirements.**
 - BOD₅: 5 mg/L
 - TSS: 10 mg/L
 - Ammonia: 1.4 mg/L June-October
2.1 mg/L November-May
- **After the fire and loss of RBC units, effluent quality suffered.**

Date: 11/24/2020

Parameter	Influent	Effluent	Permit
BOD ₅	380 mg/L	15 mg/L	5 mg/L
TSS	350 mg/L	23 mg/L	10 mg/L
Ammonia	---	27 mg/L	2.1 mg/L

These are the results following a string of bad days with coagulant accidents and sand filters in need of maintenance.

- **With startup of the new RBC units, effluent quality has been improving and is expected to meet permit soon.**

EFFLUENT ON A GOOD DAY...

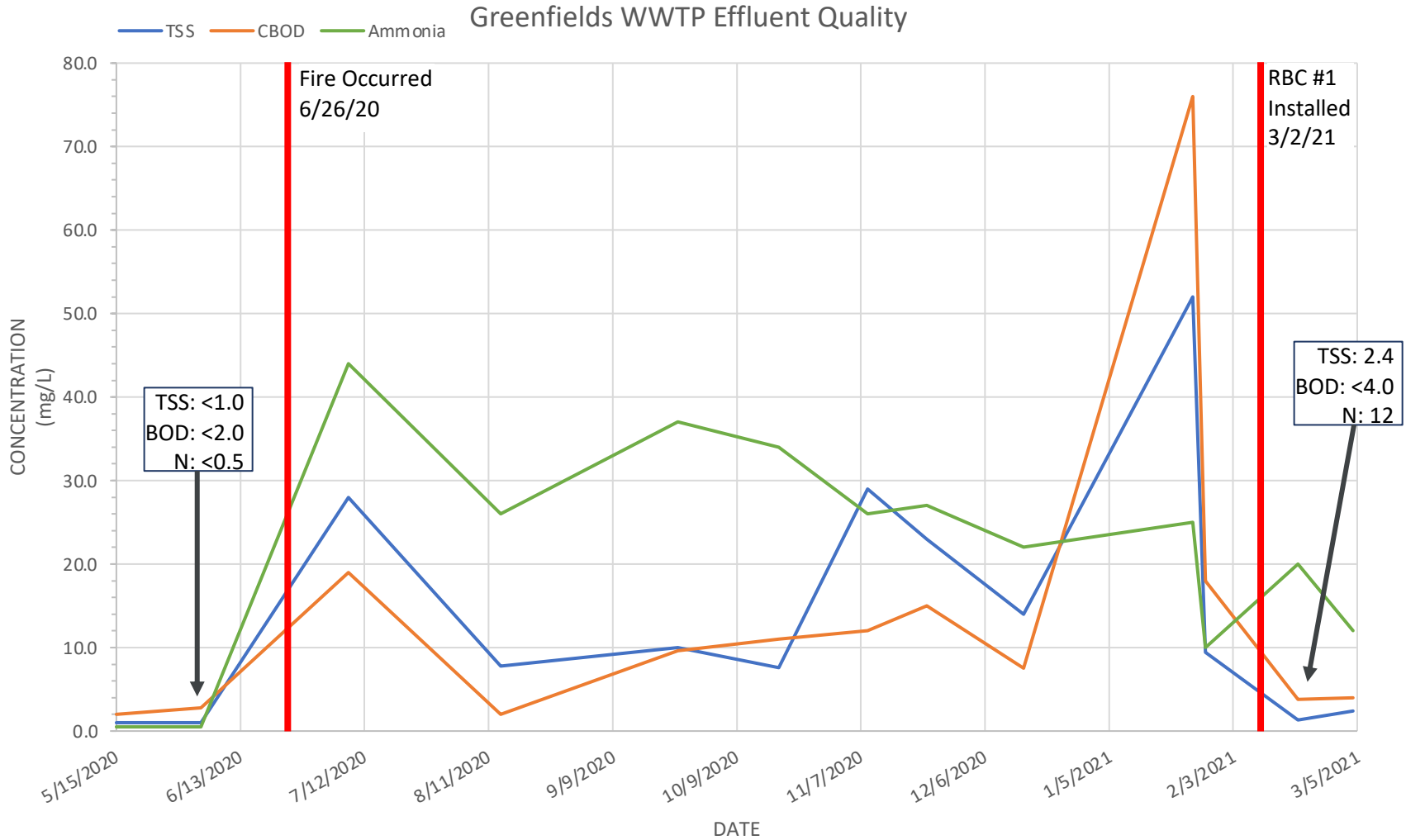
but ammonia was still high.

GFS WWTP 2020-12-16
Weather – cloudy, dry 20F
Effluent Flow Meter
30gpm/43,200gpd

Treatment Status:
Grit – Normal
Grinder – Broken scheduled for repair
Pri Clarifier – South out of service / North operational
RBC – Out of service – Replacement scheduled for install Jan-Feb 2021
Sec Clarifier – Two Square operational – Two Round out of service
Sand Filters – SW#2 & NE#3 Active – SE#1 & NW#4 Cleaned and ready for service
Disinfection – Cl2 online
Post Aeration – Temporary Air online



PRE-FIRE → COAG+FILTERS → NEW RBCs



REPLACING THE RBCs

- After first steps to protect health and provide treatment, the focus was on accelerating the approval, delivery, installation, and startup of the new RBC units.
- Major impediment to this work was industry wide manufacturing delays due to COVID-19. Did not know if we had RBCs or not until the units were on the road.
- Closure of site for fire investigation resulted in the loss of over 30 days of construction time. More time was lost with increased demolition scope, inspection and repairs to the existing RBC tanks, and providing temporary power to new RBCs.
- Contractor schedule May 2020 had RBC startup completed 1/12/21.
- Reality had first RBC in service on 2/10/2021 and second in service on 3/2/2021.

DEMOLITION AND CLEAN UP OF RBCS



EMPTY TANKS BEFORE INSPECTION DAY



CONSTRUCTION OF NEW CONCRETE PILASTERS TO ANCHOR RBCs



All
cured
and
with
the
control
panel,
too!



DELIVERY AND SETTING OF NEW RBCs



First on the truck...



... and then there were two



CAN YOU SPOT THE DIFFERENT MEDIA DENSITIES?



High

High

Standard

Standard

STARTUP, COVERS, AND FIRST GROWTH

Grease your RBCs first...



...then tuck them under the covers...



... and in 6 to 8 weeks they will be all grown up!

BEFORE AND AFTER



Before



After

QUESTIONS!

TRUE or FALSE:

Restoring disinfection was the first step taken to protect public health?



hint...

...hint...



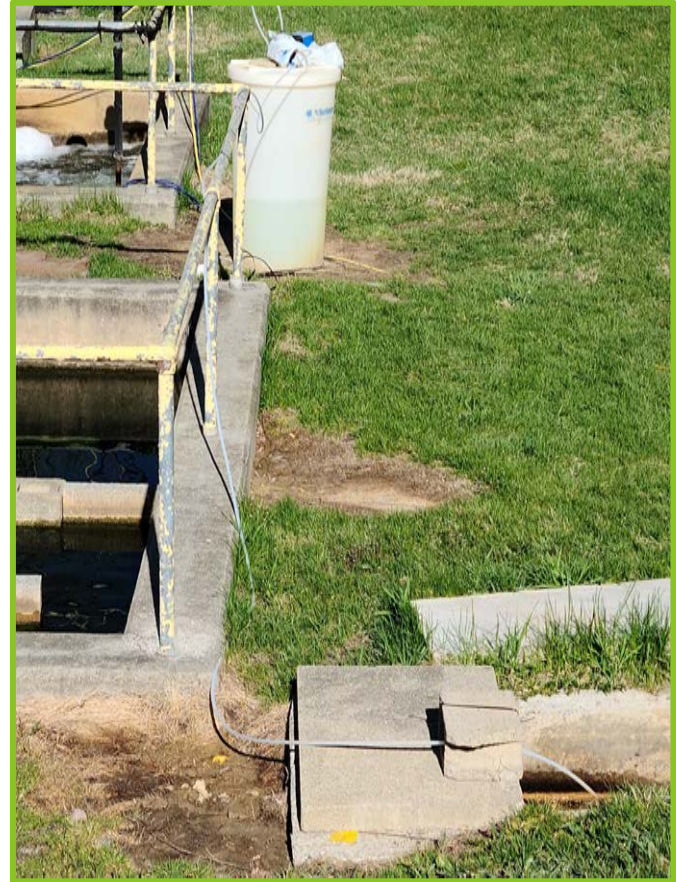
hint.

QUESTIONS!

- Restoring disinfection was the first step taken to protect public health.

Answer:

TRUE!



QUESTIONS!

TRUE or FALSE:

FLOCCER-4000 was used for Enhanced Coagulation at the Greenfields WWTP.

No hints this time....

QUESTIONS!

- **FLOCCER-4000** was used for Enhanced Coagulation at the Greenfields WWTP.

Answer:

FALSE!

SURFLOC C-3000
was the enhanced
coagulant used.



I think this one
had the Surfloc...

WHERE IS GREENFIELDS NOW?



WHERE IS GREENFIELDS NOW?



WHERE IS GREENFIELDS NOW?



THANK YOU FOR LISTENING!



please make all questions in a true or false format only