Greater Augusta Utility District
Water | Sewer | Storm Water

24th Annual New England Pretreatment Coordinators' Workshop

Case Study: Sneak Attack – We Didn't See it Coming!

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Greater Augusta Utility District

October 27, 2022

Case Study: Sneak Attack – We Didn't See it Coming!

Agenda

1. Introduction
2. Toxicity Observations and Timelines
3. Permit Violations
4. Chemical Analyses
5. Consultations with MEDEP Inspector Jim Crowley
6. Investigations and Literature Reviews
7. Secondary Treatment System Recovery
8. Lessons Learned


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GREATER AUGUSTA UTILITY DISTRICT

4,655 Catch basins
100 Miles of Stormwater Piping

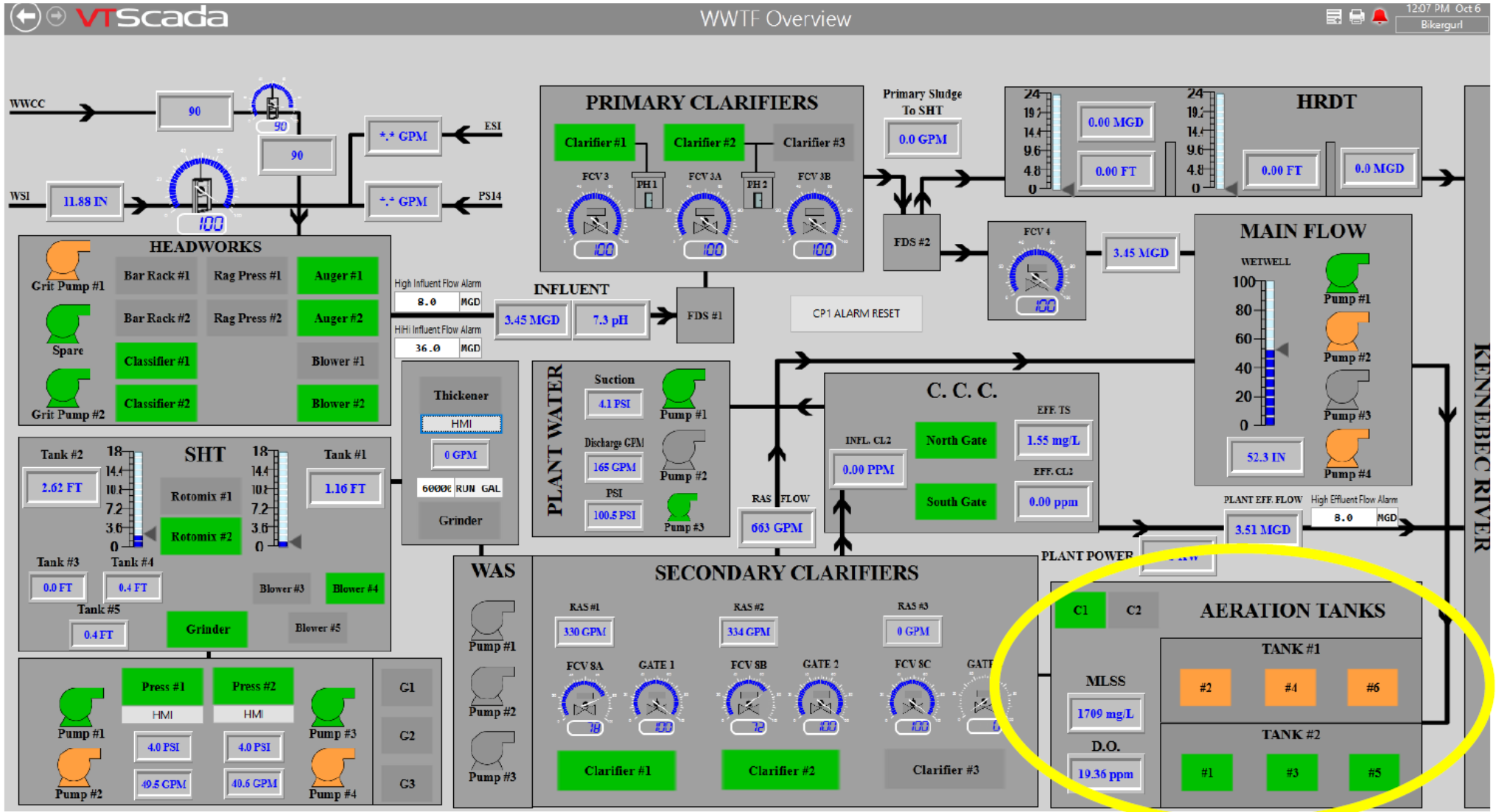
4,008 Manholes
142 Miles of Sewer Piping

Wastewater Treatment Plant
8.0 MGD Design Flow; 4.0 MGD Average Daily Flow

13 Wastewater Pump Stations

4,828 Service Customers
3 Significant Industrial Users

RV Dump Station (no other hauled wastes)


VTScada
WWTF Overview
12:07 PM Oct 6
Bikergurl
WWCC
90
90
90
. GPM
ESI
WSI
11.88 IN
100
. GPM
PS14
HEADWORKS
Grit Pump #1
Bar Rack #1
Rag Press #1
Auger #1
Spare
Bar Rack #2
Rag Press #2
Auger #2
Classifier #1
Blower #1
Grit Pump #2
Classifier #2
Blower #2
High Influent Flow Alarm
8.0 MGD
HiHi Influent Flow Alarm
36.0 MGD
INFLUENT
3.45 MGD
7.3 pH
FDS #1
PRIMARY CLARIFIERS
Clarifier #1
Clarifier #2
Clarifier #3
FCV 3
PH 1
FCV 3A
PH 2
FCV 3B
100
100
100
Primary Sludge To SHT
0.0 GPM
FDS #2
FCV 4
100
3.45 MGD
HRDT
0.00 MGD
0.00 FT
0.00 FT
0.0 MGD
MAIN FLOW
WETWELL
52.3 IN
Pump #1
Pump #2
Pump #3
Pump #4
CP1 ALARM RESET
Thickener
HMI
0 GPM
60000 RUN GAL
Grinder
PLANT WATER
Suction
4.1 PSI
Discharge GPM
165 GPM
PSI
100.5 PSI
Pump #1
Pump #2
Pump #3
C. C. C.
INFL. CL2
0.00 PPM
North Gate
South Gate
EFF. TS
1.55 mg/L
EFF. CL2
0.00 ppm
RAS FLOW
663 GPM
PLANT EFF. FLOW
3.51 MGD
High Effluent Flow Alarm
8.0 MGD
KENNEBEC RIVER
SHT
Tank #2
2.62 FT
Rotomix #1
Rotomix #2
Tank #1
1.16 FT
Tank #3
0.0 FT
Tank #4
0.4 FT
Tank #5
0.4 FT
Grinder
Blower #3
Blower #4
Blower #5
WAS
Pump #1
Pump #2
Pump #3
SECONDARY CLARIFIERS
RAS #1
330 GPM
RAS #2
334 GPM
RAS #3
0 GPM
FCV 8A
GATE 1
FCV 8B
GATE 2
FCV 8C
Clarifier #1
Clarifier #2
Clarifier #3
PLANT POWER
C1
C2
AERATION TANKS
TANK #1
#2
#4
#6
TANK #2
#1
#3
#5
MLSS
1709 mg/L
D.O.
19.36 ppm
Press #1
HMI
Press #2
HMI
Pump #1
Pump #2
Pump #3
Pump #4
4.0 PSI
49.5 GPM
4.0 PSI
40.6 GPM
G1
G2
G3

First Occurrence, 12/07/2021

Date	Effluent CBOD5 mg/L	Effluent TSS mg/L
12/02-12/03/21	10	14
12/07-12/08/21	39	29
12/08-12/09/21	51	37
12/09-12/10/21	57	48
12/14-12/15/21	>76.5	65
Weekly Avg.	49	38
Monthly Avg.	22	22

Date	MLSS mg/L
12/06/21	1304
12/07/21	340
12/08/21	48

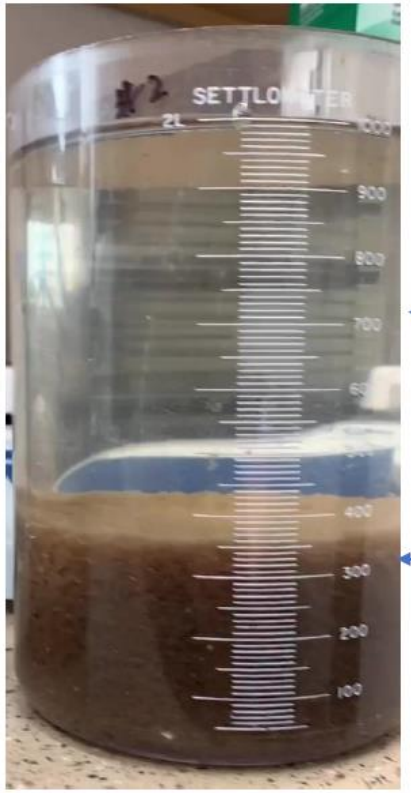
CBOD5 Daily Max Limit 45 mg/L
CBOD5 Weekly Average Limit 40 mg/L
CBOD5 Monthly Average Limit 25 mg/L

TSS Daily Max Limit 50 mg/L
TSS Weekly Average Limit 45 mg/L
TSS Monthly Average Limit 30 mg/L

Date	Influent pH
30-Nov-21	7.6
1-Dec-21	7.6
2-Dec-21	7.3
3-Dec-21	7.7
4-Dec-21	
5-Dec-21	
6-Dec-21	7.3
7-Dec-21	7.6
8-Dec-21	7.8
9-Dec-21	7.4
10-Dec-21	7.7
11-Dec-21	
12-Dec-21	
13-Dec-21	7.2
14-Dec-21	7.2
15-Dec-21	7.7
16-Dec-21	7.5

Settleability

Settleability Test – Optimum Result

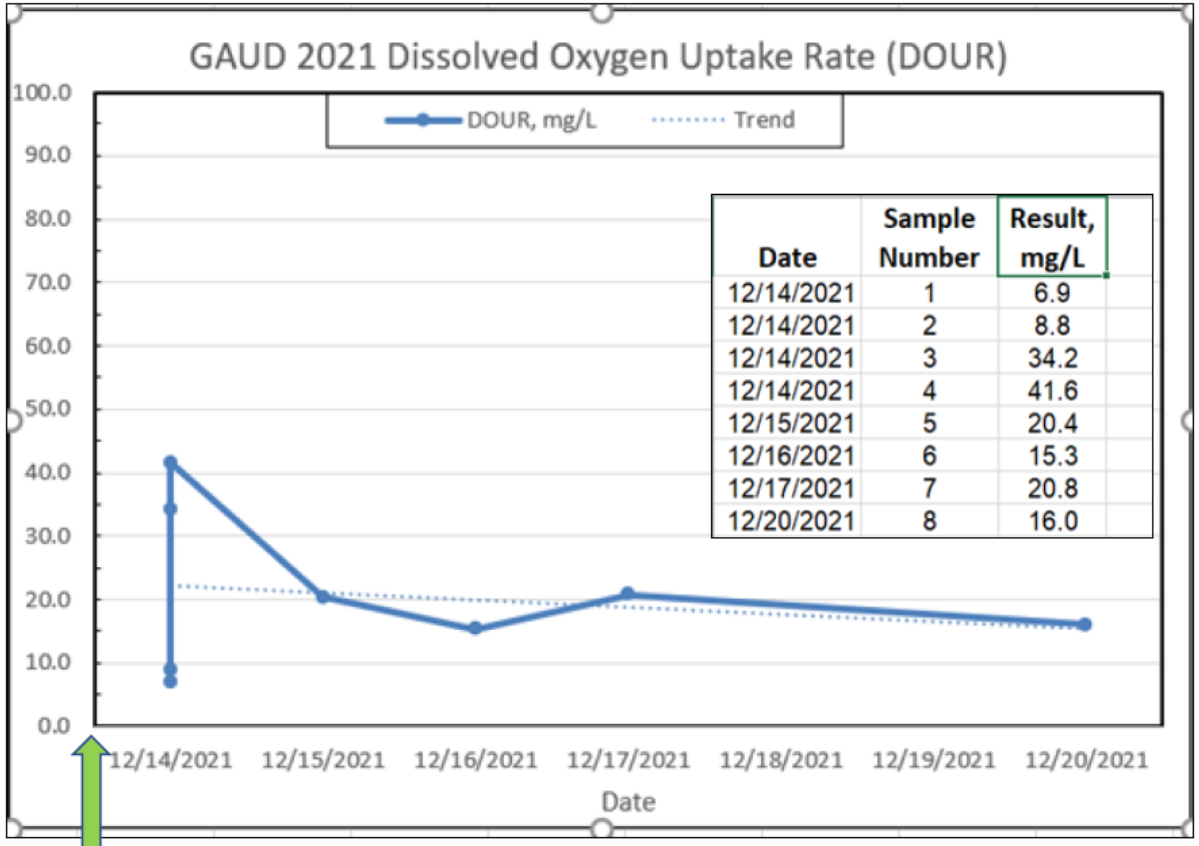


Clear Supernatant

Distinct Solids Layer

GAUD Settleability Test Due to Toxicity
(Note the lack of solids)

Re-seeding the Secondary Treatment System



Date	Sample Number	Result, mg/L
12/14/2021	1	6.9
12/14/2021	2	8.8
12/14/2021	3	34.2
12/14/2021	4	41.6
12/15/2021	5	20.4
12/16/2021	6	15.3
12/17/2021	7	20.8
12/20/2021	8	16.0

Added 47,000 gallons of “seed” from nearby wwtp, 12/10 – 12/14/21

Dissolved Oxygen Uptake Rate (DOUR)

$$\text{DOUR } (mgO_2/liter/hour) = \frac{[\text{D.O. initial in mg/L} - \text{D.O. final in mg/L}] \times 60 \text{ min/hr}}{\text{Duration of test in minutes}}$$

Example: Initial DO = 8.5 mg/L, Final DO = 2.0 mg/L, Test Duration = 15 minutes

$$\text{DOUR } (mgO_2/liter/hour) = \frac{[8.5 \text{ mg/L} - 2.0 \text{ mg/L}] \times 60 \text{ min/hr}}{15 \text{ minutes}}$$

$$\text{DOUR } (mgO_2/liter/hour) = \frac{6.5 \text{ mg/L} \times 60 \text{ ~~min~~/hr}}{15 \text{ ~~minutes~~}}$$

$$\text{DOUR } (mgO_2/liter/hour) = \frac{390 \text{ mg/L /hr}}{15}$$

$$\text{DOUR} = 26 \text{ mg/L/hr}$$

Second Occurrence, 1/24/2022 (approx.)
(48 Days from First Occurrence)

CBOD5 Daily Max Limit 45 mg/L
CBOD5 Weekly Average Limit 40 mg/L
CBOD5 Monthly Average Limit 25 mg/L

TSS Daily Max Limit 50 mg/L
TSS Weekly Average Limit 45 mg/L
TSS Monthly Average Limit 30 mg/L

*Added trucked-in seed on 1/26/22

Date	Effluent CBOD5 mg/L	Effluent TSS mg/L
1/20 – 1/21/22	11	10
1/25 – 1/26/22	48	18
*1/26 – 1/27/22	45	31
Weekly Avg.	43	24
Monthly Avg.	18	13

Date	MLSS mg/L
1/24/22	1628
1/25/22	1020
*1/26/22	332

Toxicity Observations and Timelines, Third Occurrence 2/16/2022 (approx. 23 Days from Second Occurrence)

CBOD5 Daily Max Limit 45 mg/L
CBOD5 Weekly Average Limit 40 mg/L
CBOD5 Monthly Average Limit 25 mg/L

TSS Daily Max Limit 50 mg/L
TSS Weekly Average Limit 45 mg/L
TSS Monthly Average Limit 30 mg/L

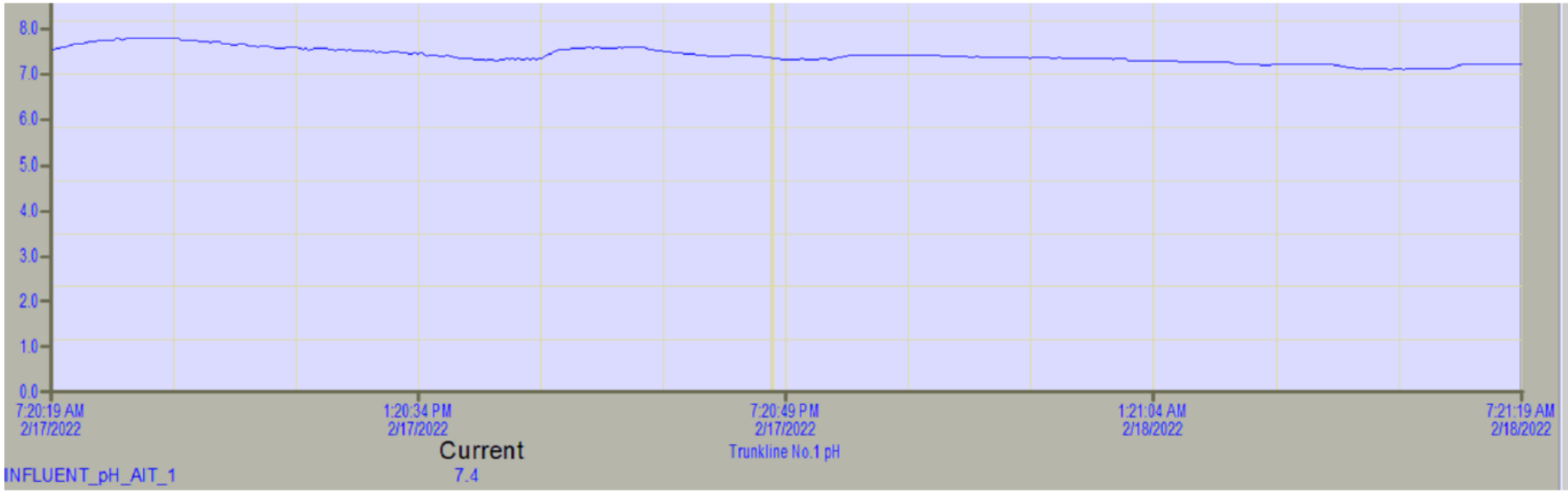
*Trucked-in seed added
2/21 – 2/22/22 and 2/24/22

Date	Effluent CBOD5 mg/L	Effluent TSS mg/L
2/15 – 2 /16/22	11	12
2/17 – 2/18/22	25	22
*2/22 – 2/33/22	29	56
*2/23 – 2/24/22	46	42
Weekly Avg.	36	43
Monthly Avg.	20	20

Date	MLSS mg/L
2/16/22	2404
2/17/22	2176
2/18/22	4
2/23/22	150
*2/24/22	1

pH Results Associated with Third Occurrence, 2/18/22 (23 Days from Second Occurrence)

Influent pH, 2/17/22 – 2/18/22



Chemical Analyses

Sampling

Began with Second Occurrence – **end of January 2022**
and after Third Occurrence – **late February 2022**

Analytes

Pesticides, Volatile Organic Compounds, Semivolatiles, Arsenic, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, Zinc, Antimony, Beryllium, Selenium, Thallium, Silver, pH
ALL Data within normal parameters or not detected!

Sampling Locations

Influent 24-hr composites and grabs
Secondary Effluent 24-hour comps and grabs
Primary Effluent 24-hour comps and grabs
Returned Activated Sludge (grabs), Mixed Liquor Suspended Solids (grabs), Mixed Liquor Supernatant (grabs)

Dewatered Biosolids

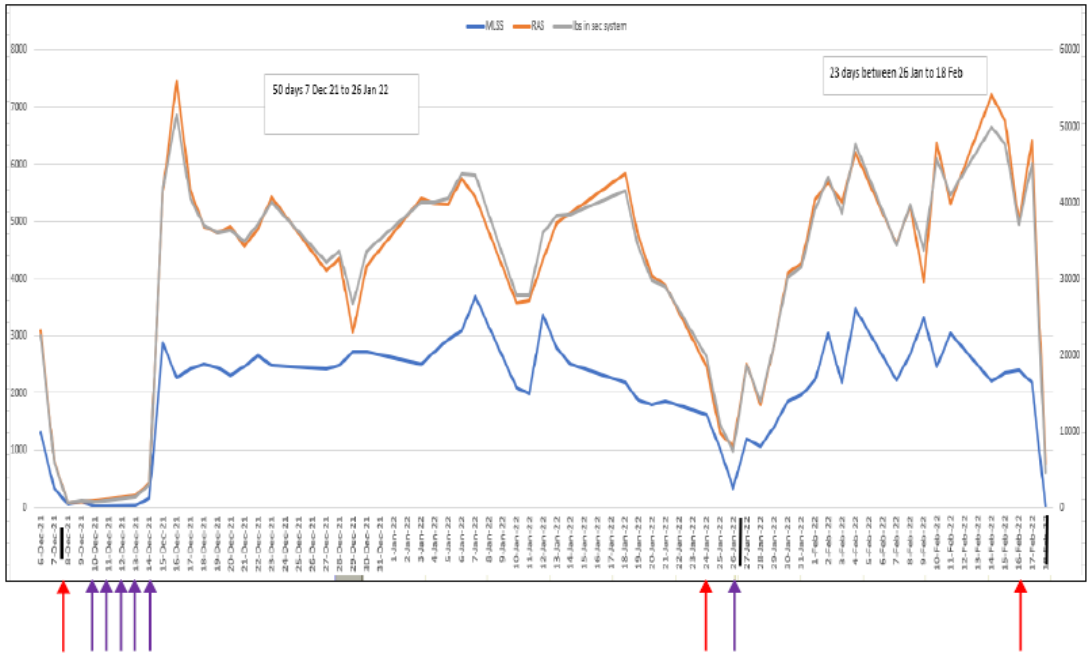
December 2021 mercury result was higher than usual. Result was 5.05mg/Kg when usual results are below detection; contract lab double-checked their data to confirm this result.
January, February and March 2022 data were within normal parameters with the exception of of 4,4' DDT = 174 mg/Kg (February 2022). This analyte was flagged due to lab quality control criterion outside acceptable range.

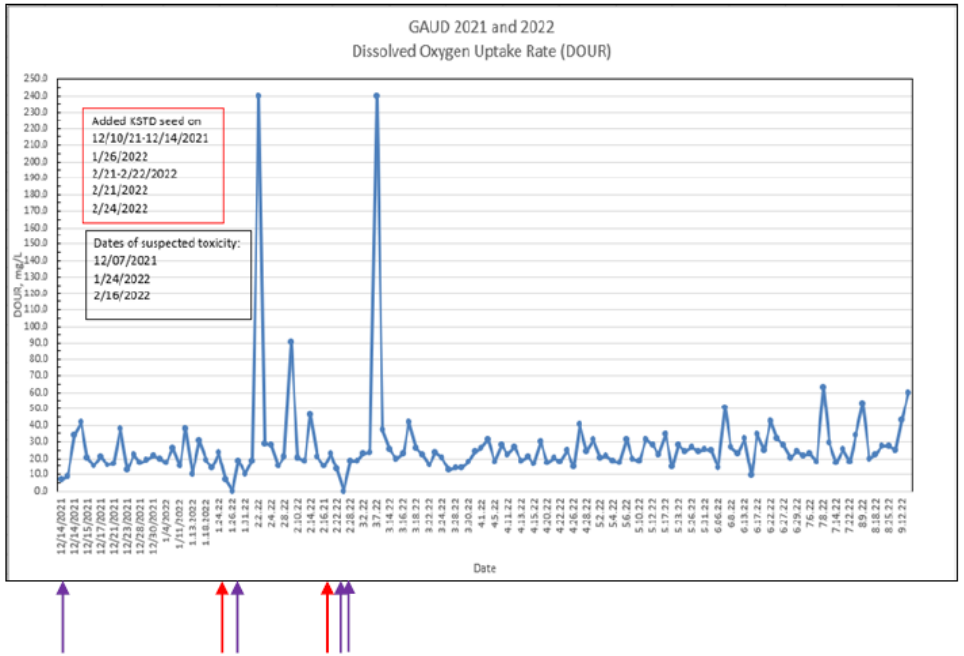
Could It Be Us?

Industrial Pretreatment Investigations

- Consultations with Maine DEP's Industrial Pretreatment Inspector
  - Lab Data unable to point to a "Smoking Gun"
- Industrial User (IU) Site Visits
  - Car Wash: Site Visit, Safety Data Sheet Reviews, Water Usage Review
  - Dry Cleaner: Site Visit, Hazardous Waste Manifest Reviews, Discussions with Maine DEP Hazardous Waste Division regarding Dry Cleaner's compliance record
  - Literature Review: Road Salt Used by Augusta Public Works
  - Discussions with Significant Industrial Users (SIUs)
  - No IU/SIU "Smoking Gun"

Biomass Toxicity Effects

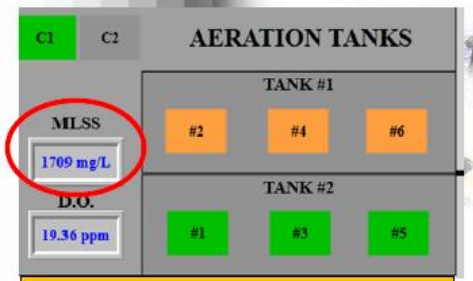




Indicates Approximate Dates of Toxicity

Indicates Dates Trucked-in Seed Added to WWTP

Lessons Learned



In-line Monitoring

New SOPs

3-day Sludge Age

Sometimes there's no answer!

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Thank You!

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