

# ProMoss Treatment Program



PRECISION CHEMICAL, LLC - YOUR PARTNER IN CHEMISTRY

# WHAT WE DO AND BACKGROUND



Cooling Water Treatment

Boiler Water Treatment



Wastewater Treatment





# OVERVIEW

- Chemistry Based Water Treatment Without Chemicals
- Benefits and Risks
- Trial Data: Nucor Steel Madison
- 1300 Ton Cooling Tower System
- **Astra Zeneca**
- **Metals Processor- Danville Metals**



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# PROMOSS

*Chemistry Based Water Treatment Without Chemicals*



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# WHAT IS IT?

- Sphagnum Moss
  - Harvested in bogs
  - Found in lakes with exceptional water clarity
- Historical Uses:
  - Used by Vikings to keep water clean on long ocean voyages
  - Used to dress wounds in WWI



**ProMoss is an environmentally friendly, safe, sustainable resource  
that supports  
green initiatives of many leading corporations**



# AstraZeneca Initiative

The graphic features a background image of a sunset or sunrise over a landscape with silhouettes of trees and light poles. The sky is filled with clouds, some of which are illuminated with a reddish-orange glow from the low sun. The text is overlaid on this image in a clean, sans-serif font.

## *Environmental protection*

Putting the planet at the heart of human health

## *Our objective*

We aim to reduce environmental impacts on human health and the natural world, using innovative science to find new ways to conserve our natural resources and ensure the environmental safety of our products.



Our Policy is to:

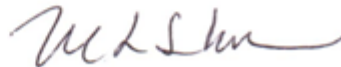
**F**oster and maintain the safest workplace in the industry while working to prevent injury, ill health, and pollution.

**O**ffer the highest quality products available in the marketplace and meet all customer requirements while upholding a commitment to protect the environment.

**C**omply with legal, statutory, regulatory, and other requirements applicable to quality, environmental, health and safety management systems.

**U**tilize all available resources to continually improve the quality, environmental, health and safety managements systems to enhance performance in all areas.

**S**et, implement, and review corporate quality, environmental, health and safety objectives and targets; annually review the policy to ensure the purpose and context is appropriate to the organization's strategic direction.



**Michael Shor**

President and CEO  
Haynes International, Inc.

“Pollution”

“Protect the environment”

“Environmental”

“Environmental”

“Environmental”





# ADVANTAGES OF PROMOSS

- **Opportunity to increase ESG score**
- Eliminates challenges associated with traditional chemical treatment programs
- Decreases water use (increases the cycles of concentration in cooling towers)
- Reduces/eliminates chemical use and disposal
- Improves water quality, clarity, stability
- Can reduce heavy metal ions
- Improves efficiency of heat transfer by removing organic contamination and scale resulting in energy savings
- Prolongs equipment life

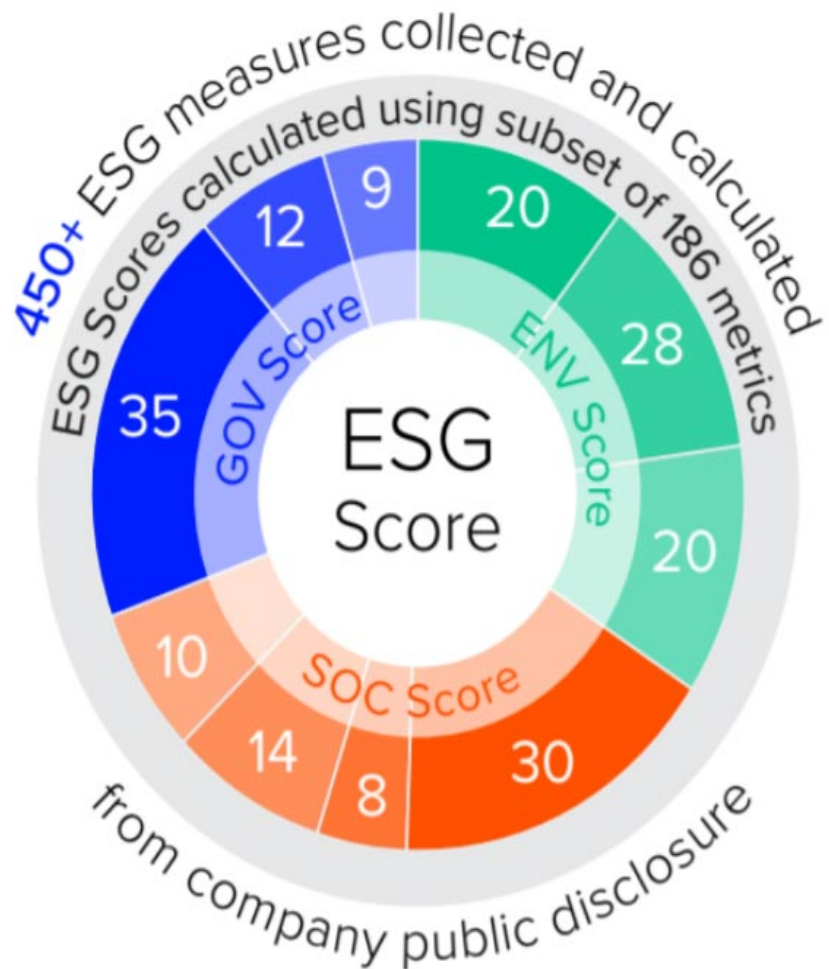
**These go away**





**ENVIRONMENTAL, SOCIAL, AND  
GOVERNANCE (ESG) CRITERIA ARE A SET  
OF STANDARDS FOR A COMPANY'S  
OPERATIONS THAT SOCIALLY CONSCIOUS  
INVESTORS USE TO SCREEN POTENTIAL  
INVESTMENTS**





## Environmental

- Resource use
- Emissions
- Innovation

## Social

- Workforce
- Human rights
- Community
- Product responsibility

## Governance

- Management
- Shareholders
- CSR strategy



# AREAS OF CONCERN W/ PROMOSS

- If a bag breaks and strainers are not in place, bags can cause a system pump to fail.
- When cages in the sump outside are used, there are possible slip hazards and removal issues pulling the cages out of the water.
- Tower access can be limited due to freezing in winter months.
- Precipitation, if cycles are not properly maintained, can plug heat exchangers.
- If proper contact of product is not maintained, scale can form in the system.
- If water usage estimates are inaccurate, product underfeed will occur and will cause insufficient treatment resulting in scaling on heat transfer surfaces.



# HOW DOES IT WORK?

- Inhibits organic contamination of all surfaces the ProMoss™ treated water touches
- Inhibits and removes scale
- Minimizes corrosion on surfaces the ProMoss™ treated water touches
- Absorbs 10X its weight in oil
- Stabilizes pH





# HOW IS IT APPLIED?

- Submersible contact chambers that require no structural modifications
- In-line contact chambers when submersible contact chambers are not appropriate
- Requires water flow across the ProMoss™
- ProMoss™ is stable up to 250° F
- Changed monthly



# PROMOSS TRIAL: NUCOR STEEL

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PRIOR TO  
PROMOSS  
TREATMENT:  
COOLING  
TOWER  
SUMP 9/26



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# AFTER PROMOSS TREATMENT: 12/07



The chamber with the ProMoss can be seen 3' below the water.



Sample of the cooling tower water





# DATA FROM LARGE MANUFACTURING FACILITY MIDWEST US

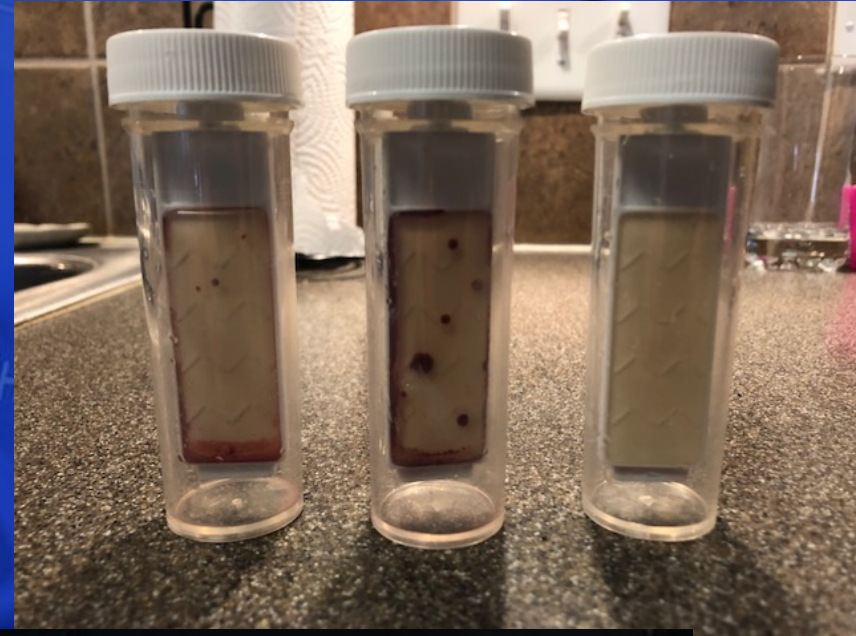


# PERFORMANCE: INHIBITION OF ORGANIC CONTAMINATION

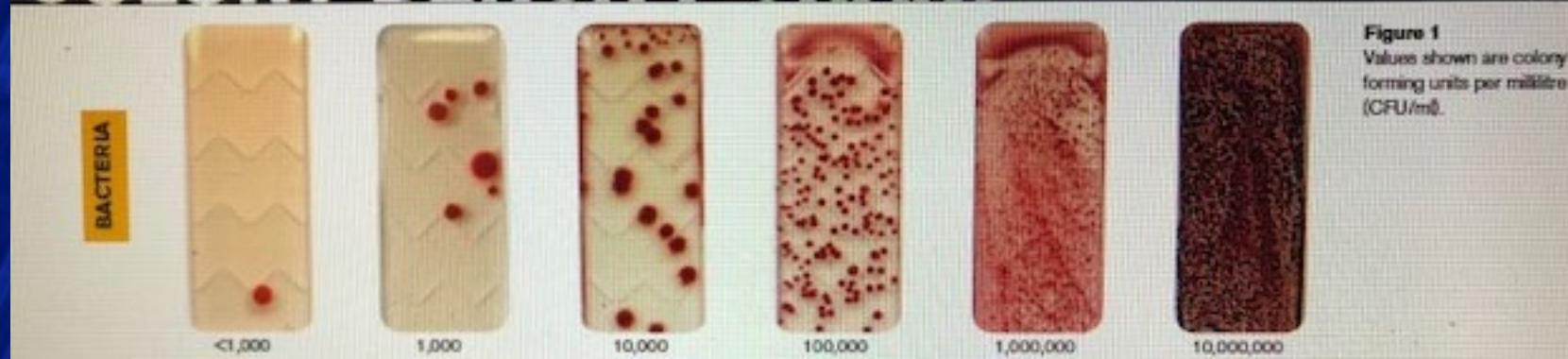
BEFORE:  $10^4 - 10^5$  CFU/mL



DURING: 100 -  $10^3$  CFU/mL



## COLONY DENSITY CHART





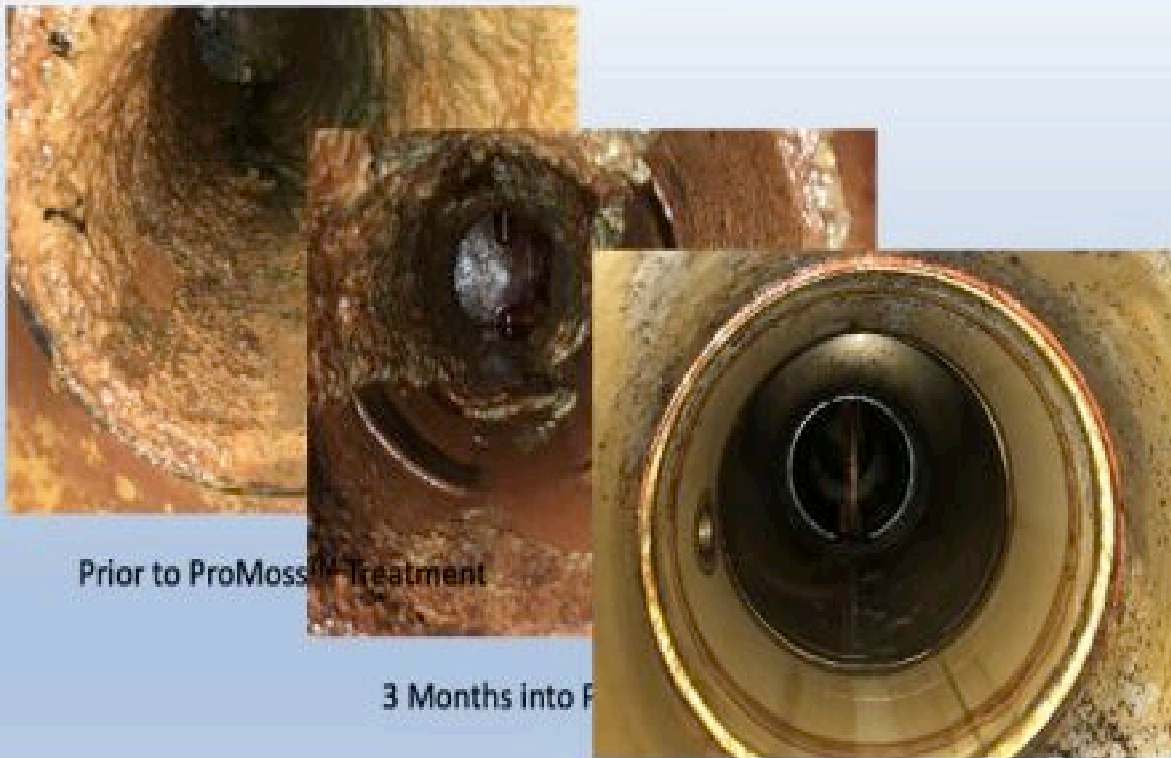
# PERFORMANCE: INHIBITION OF SCALE

- No signs of scale formation
  - During the entire trial period the mineral balance of the samples tested within + or – 2% of the make-up water mineral balance
- Delta P across Heat Exchangers Improved by:
  - 4 PSI on WS-1
  - 3 PSI on WS-2
  - The above indicates pre-existing fouling/scale is actively being removed





## Deposit Removal with ProMoss™



Prior to ProMoss™ Treatment

3 Months into ProMoss™ Treatment

18 Months on ProMoss™





# PERFORMANCE: CORROSION STUDY

- ▶ AVG MILD STEEL: 3.448 mpy
- ▶ COPPER: 0.23 mpy.

**Classification of Corrosion Rates for Open Recirculating Cooling Water Systems**  
*(Corrosion Rates, mpy)*

<b>Description</b>	<b>Carbon Steel</b>	<b>Copper Alloys</b>
Negligible or Excellent	Less than or equal to 1	Less than or equal to 0.1
Mild or Very Good	1 to 3	0.1 to 0.25
Good	3 to 5	0.25 to 0.35
Moderate to Fair	5 to 8	0.35 to 0.5
Poor	8 to 10	0.5 to 1
Very Poor to Severe	>10	>1

# PERFORMANCE: WATER USAGE

- 18-19% reduction in water usage:
  - Increased cycles of concentration from 1.8 to 2.2
  - Eliminated chemical contribution to cycles of concentration
- This equates to a savings of 388,355 gallons in the first 90 days of the trial





# PROMOSS TRIAL: 1300 TON COOLING TOWER SYSTEM

*Chemistry Based Water Treatment Without Chemicals*



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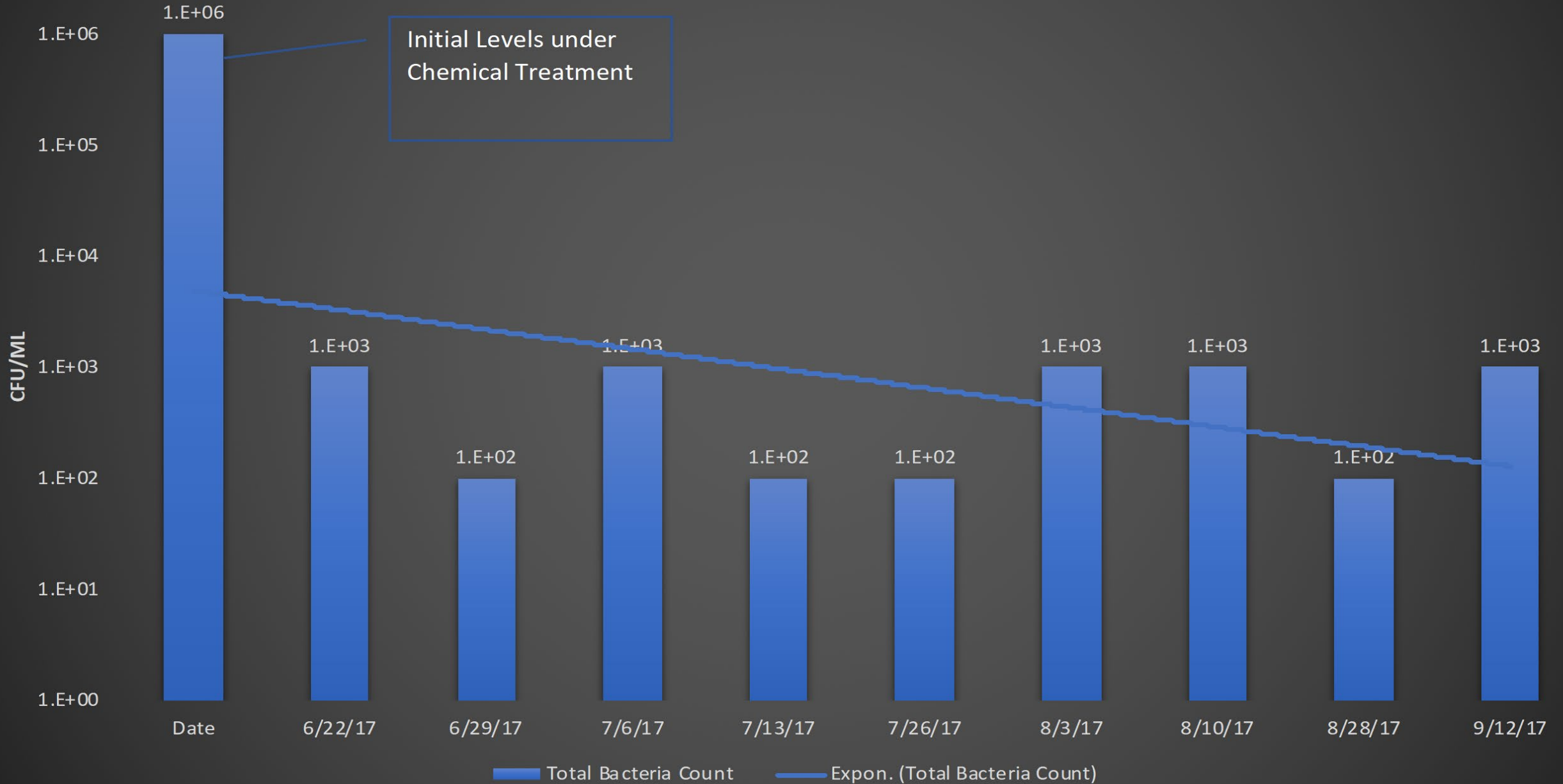
Total Bacteria  
Count  
 $10^7$  CFU/ml  
ATP – 2,610 RLU's  
Turbidity – 28  
NTU's  
Iron – 1.69 ppm  
Copper – 0.42





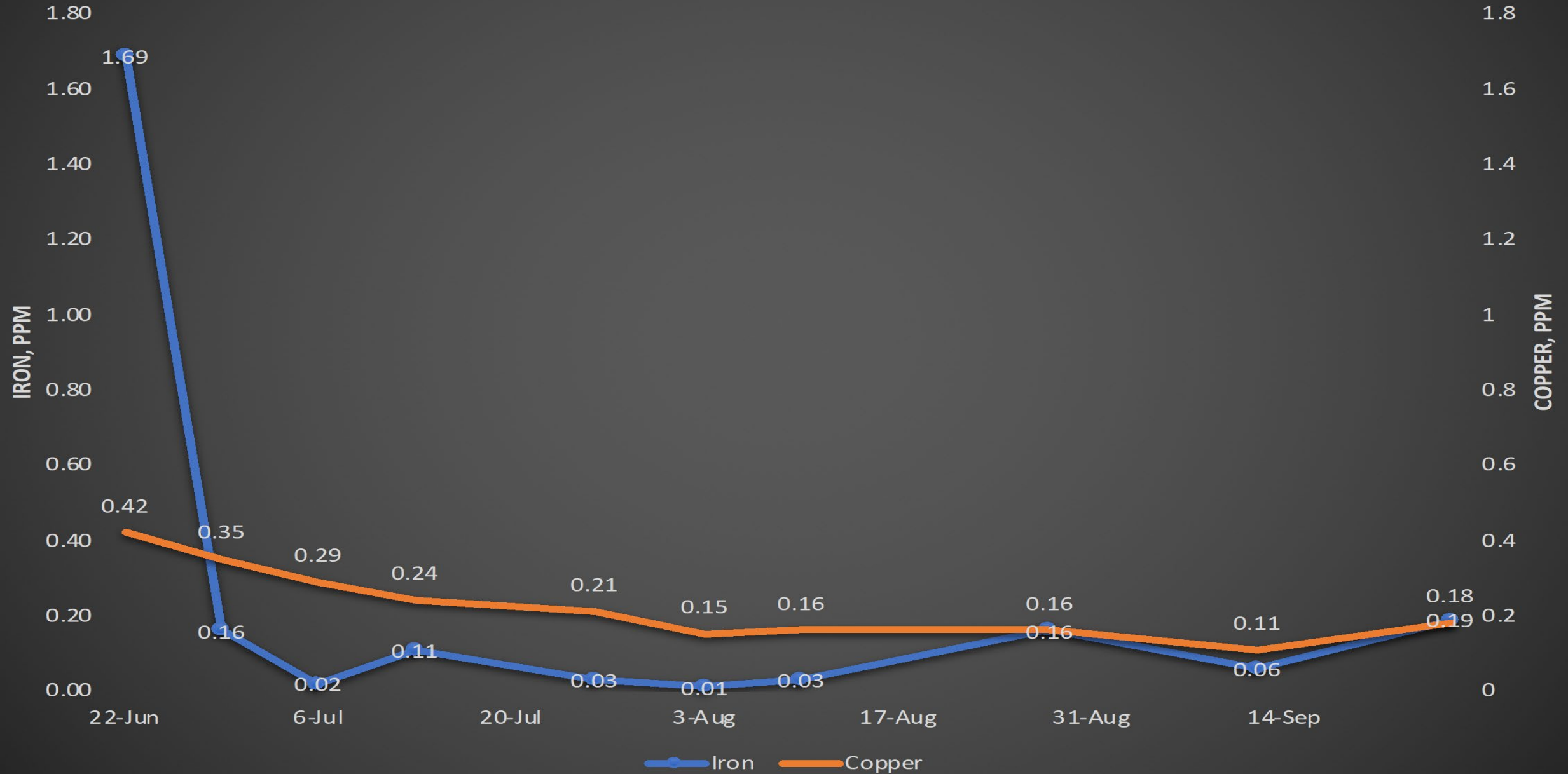
Total Bacteria  
Count  
 $10^2$  CFU/ml  
ATP – 126 RLU's  
Turbidity – 2  
NTU's  
Iron – 0.02 ppm  
Copper – 0.29

# Total Bacteria Counts- 1,300 Ton Tower Moss Treated





# Cooling Tower Water Dissolved Metals





# AstraZeneca tower photos



12 days of ProMoss

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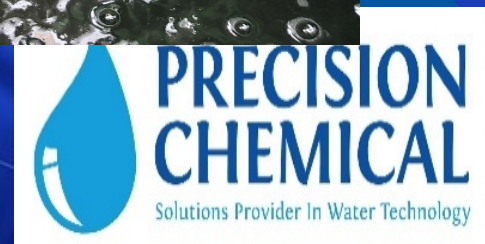


# AstraZeneca tower photos



12 days of ProMoss

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**Metals Processing facility**

**Thermo Treating Division**

**4 towers**

**Started w Tower 17**





**Tower 17  
untreated  
5-29-19**





**Tower 17**  
**10 days**  
**6-7-19**





**Tower 17**  
**30 days**  
**7-3-19**



**Significant Fe reduction**





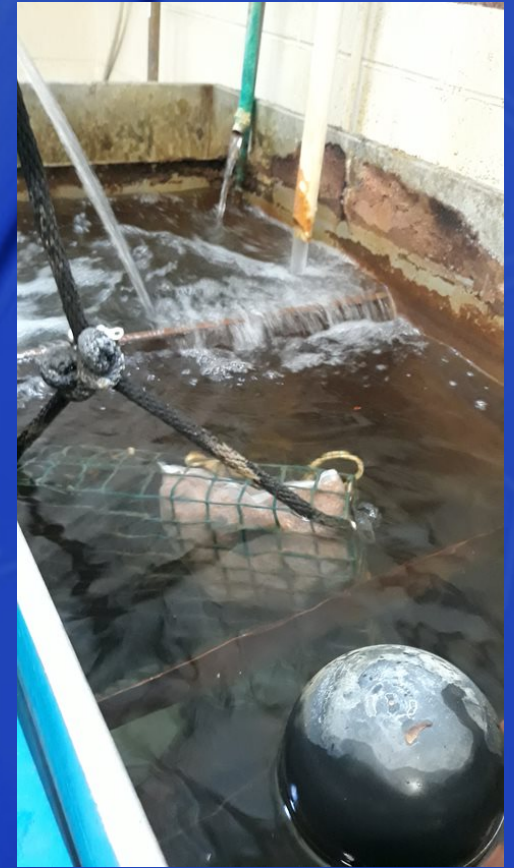
**Tower 17**  
**60 days**  
**7-30-19**



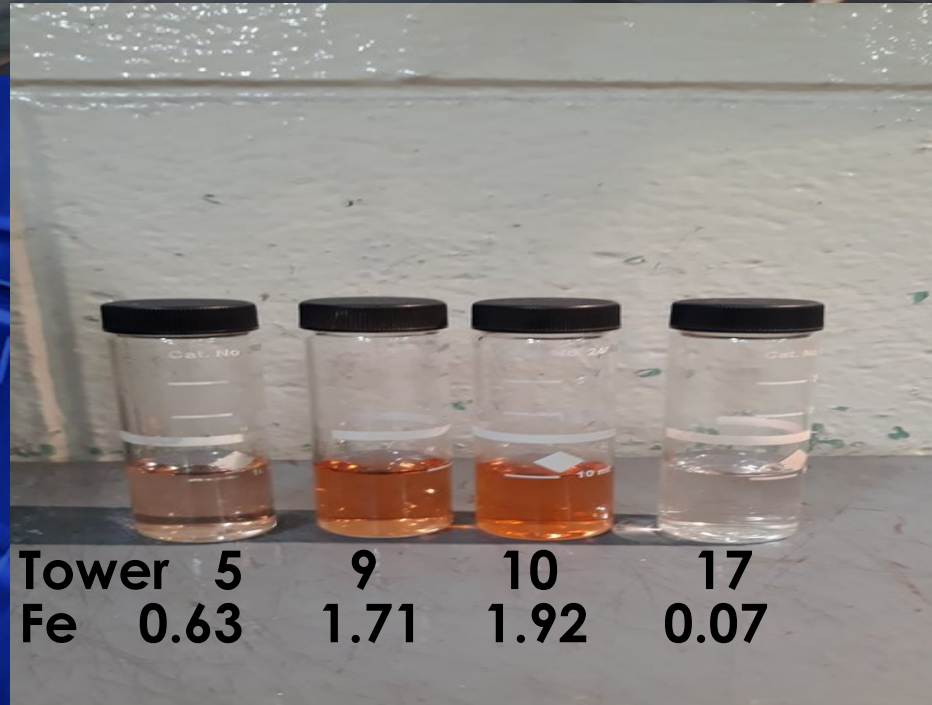
**Scale and biology sloughing off walls of tank**







**Tower 17**  
**90 days**  
**8-28-19**



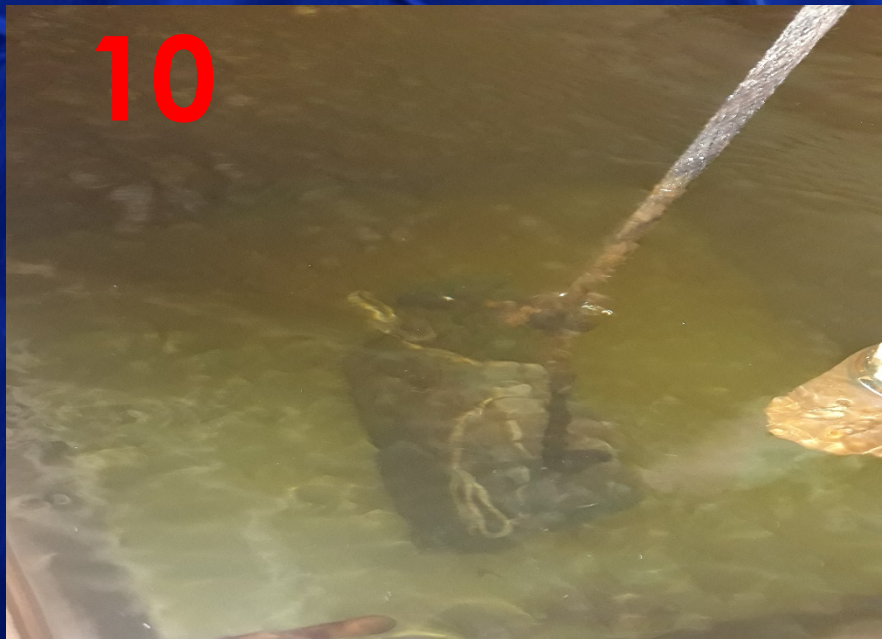
Tower	5	9	10	17
Fe	0.63	1.71	1.92	0.07



Subsequently, Towers 5, 9, and 10 added to ProMoss program at Thermo Division while Press Tower and Compressor Tower added at Stamping Division

Performance summaries for Towers follow:





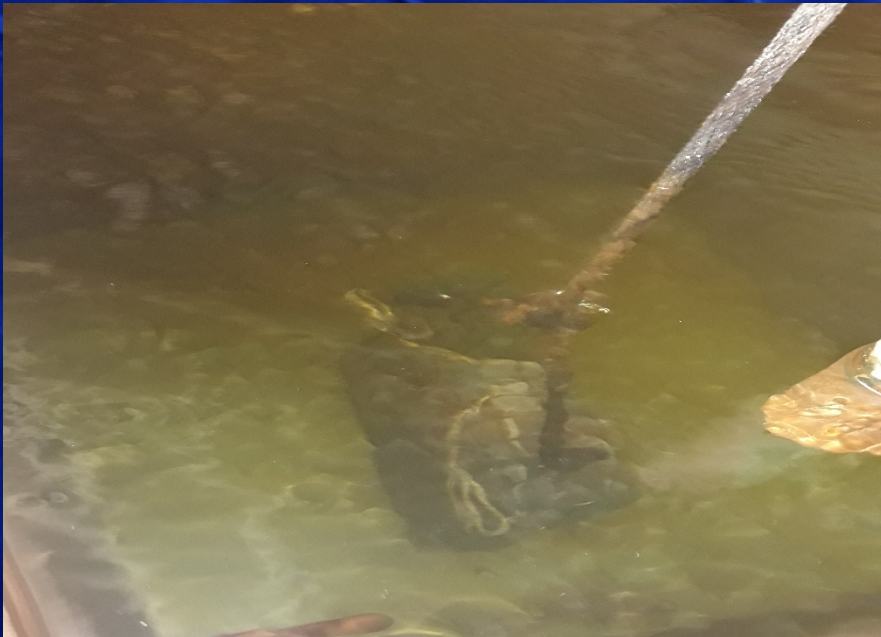
**Tank 5 without**

**Tank 9 without**

**Tank 10 ProMoss**

**Tank 17 ProMoss**





**Tank 5 ProMoss**

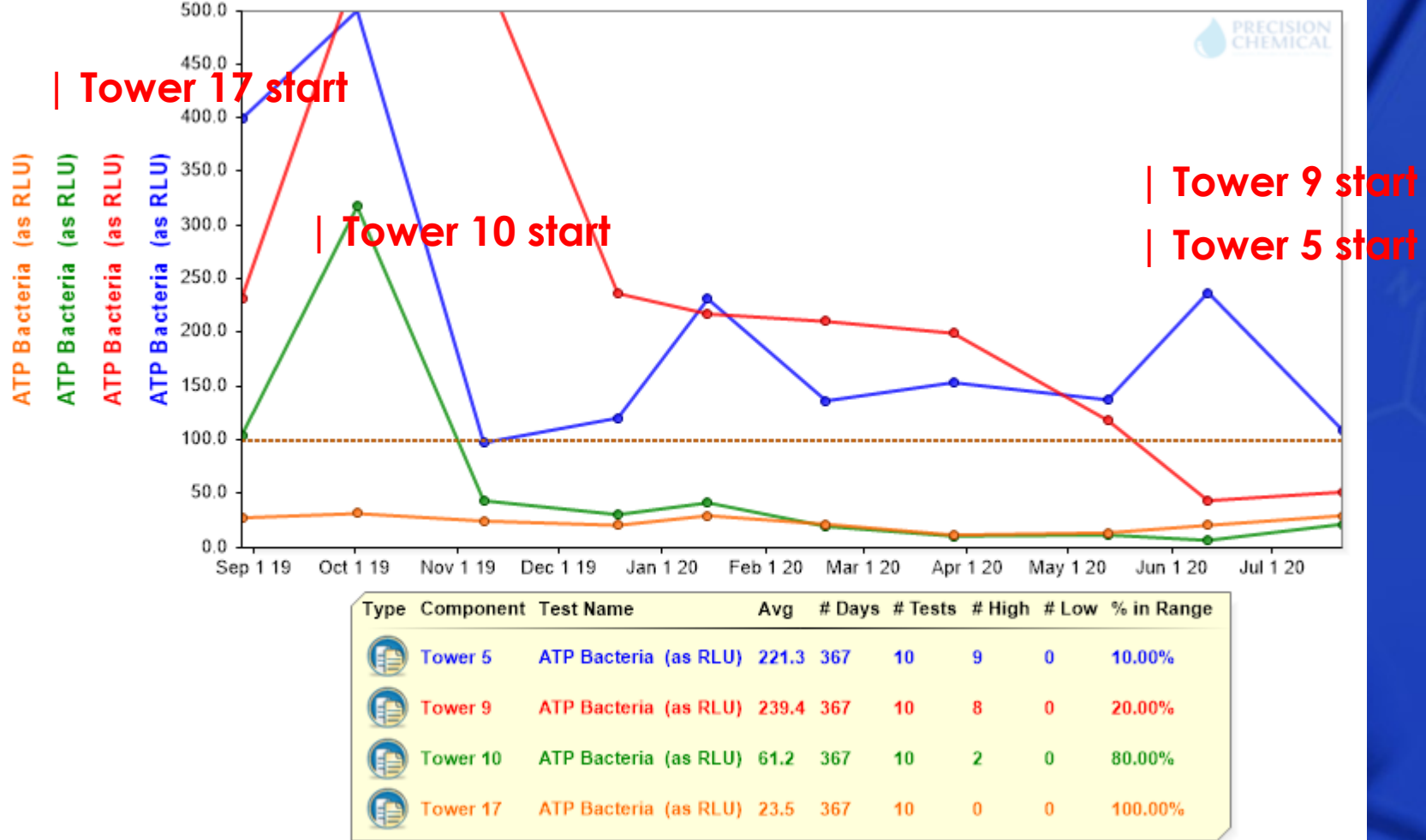
**Tank 9 ProMoss**

**Tank 10 ProMoss**

**Tank 17 ProMoss**

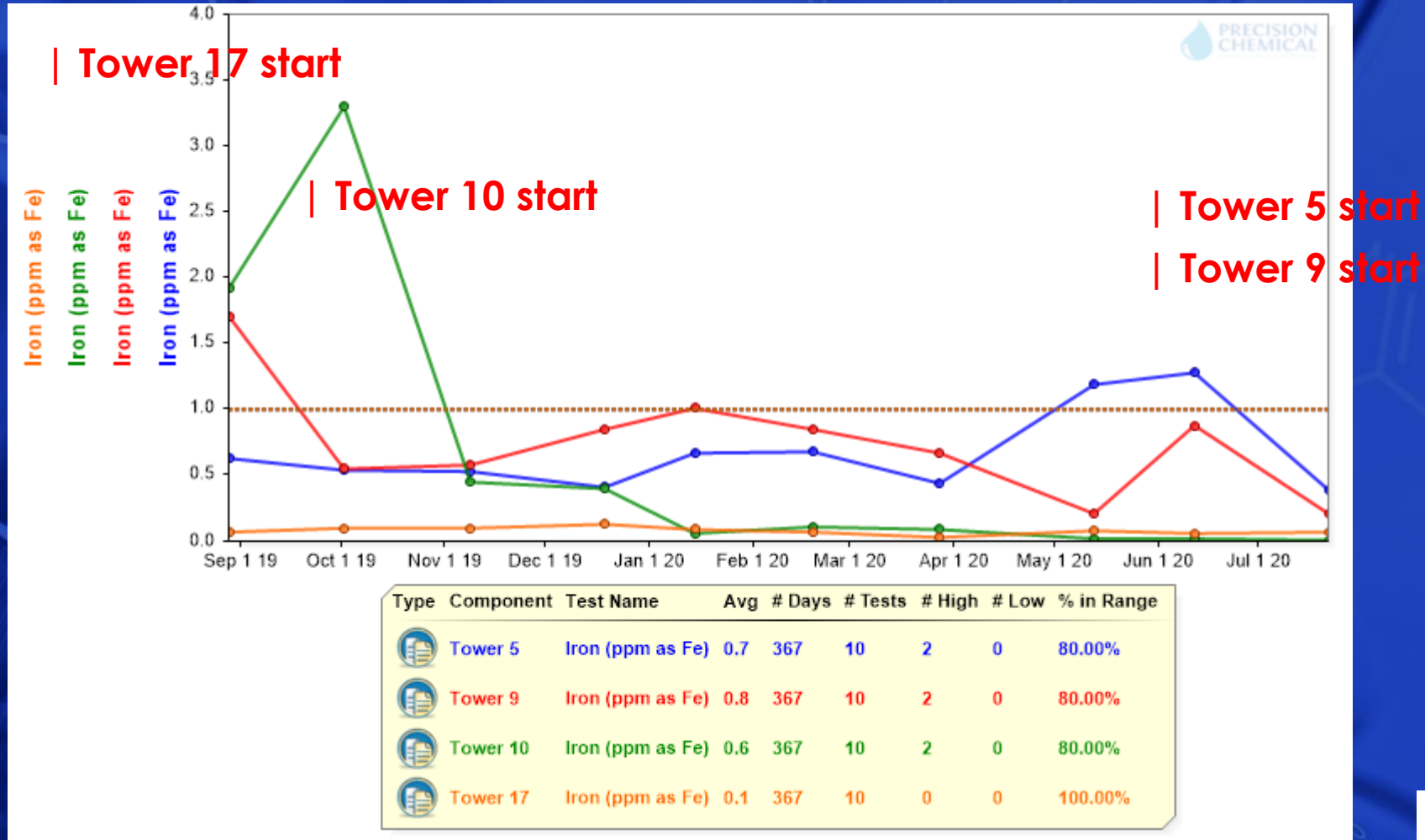


# Danville Thermo Microbiology



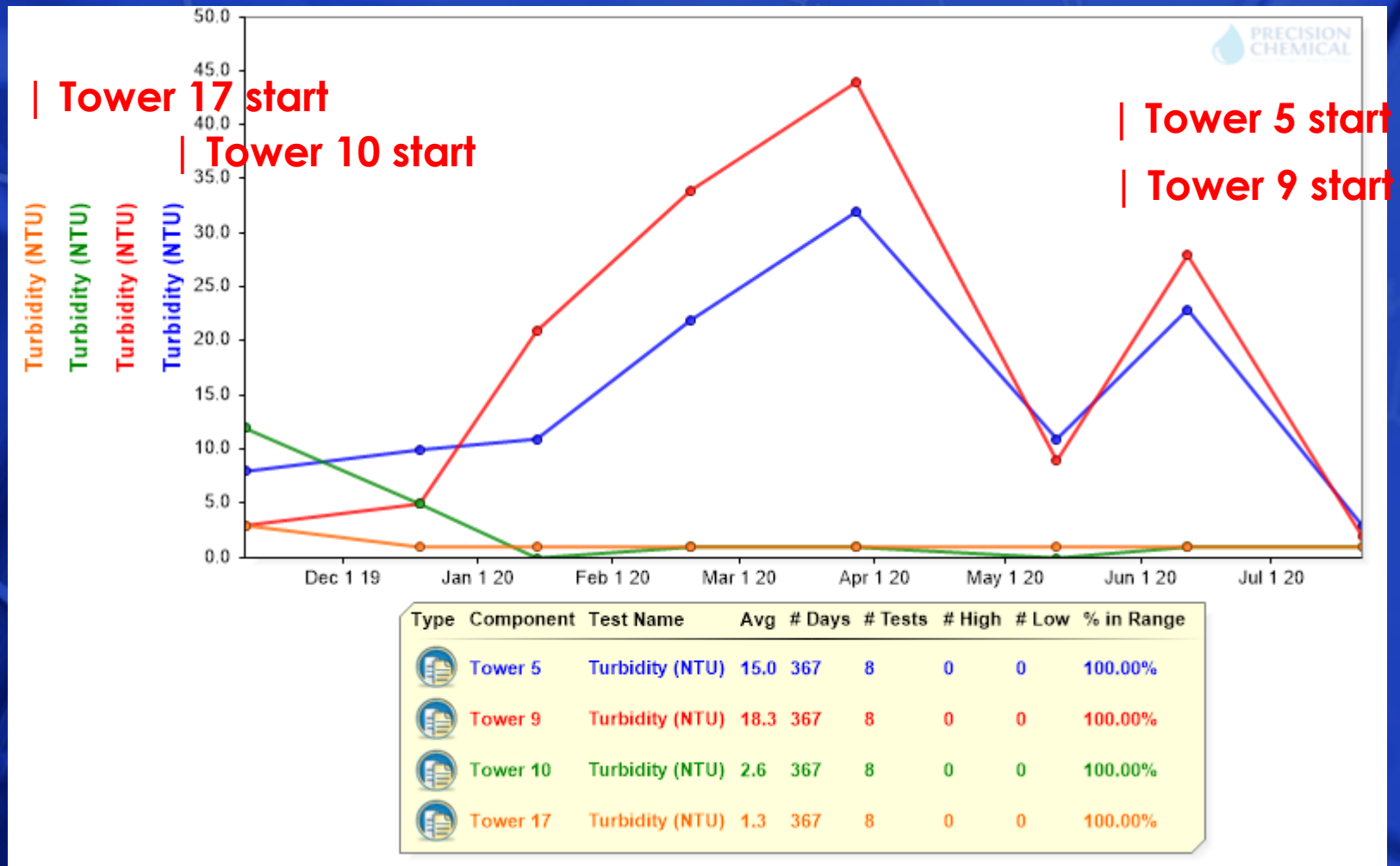


# Danville Thermo Dissolved Metal - Iron



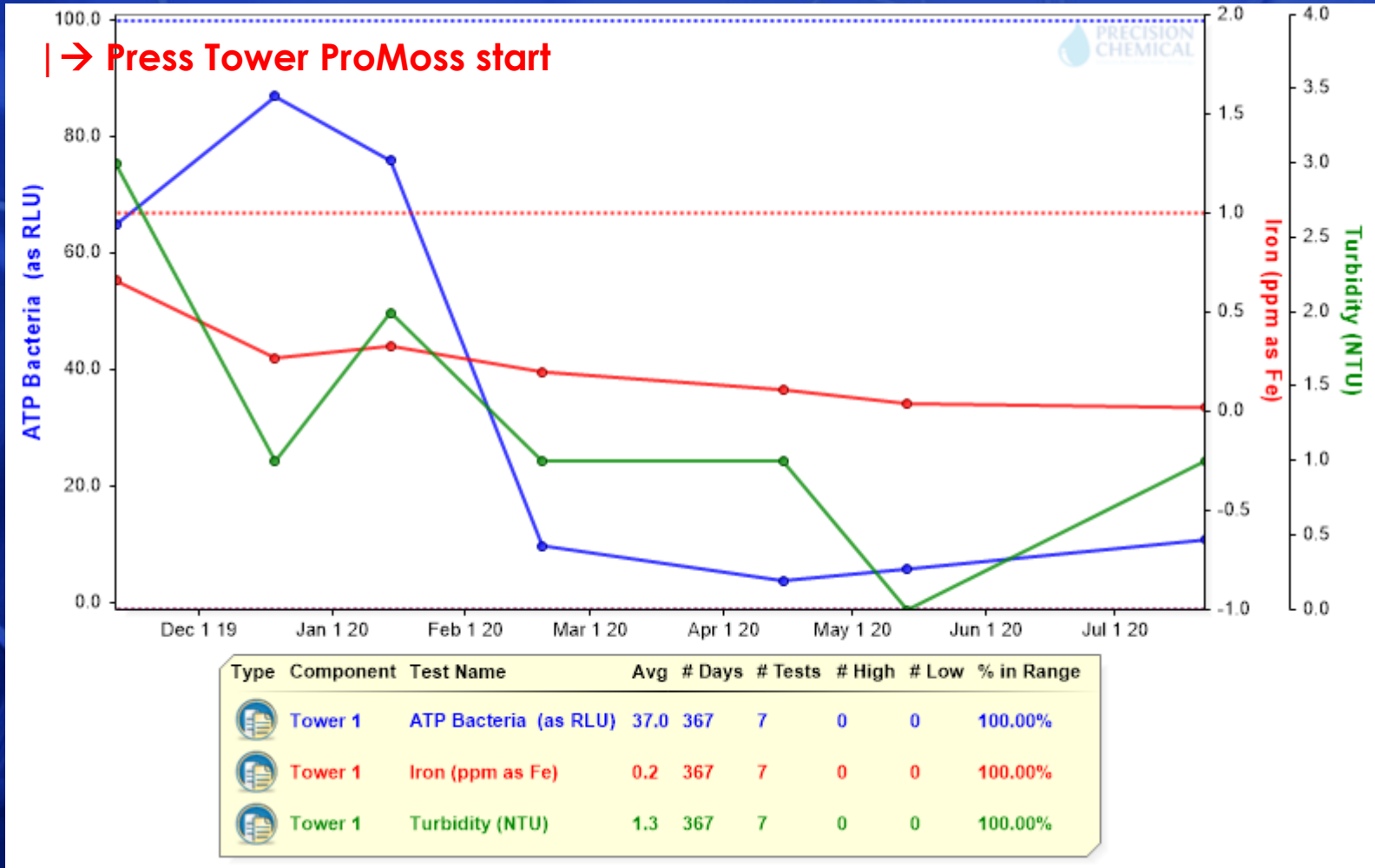


# Danville Thermo Suspended Solids - Turbidity





# Danville Stamping Press Tower Performance





# Thank you

## QUESTIONS AND ANSWERS

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