CASE STUDY

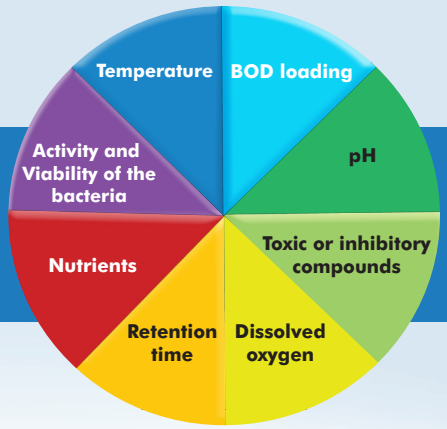
WELLNESS CHECK ON TREATMENT PLANT ONE YEAR AFTER PLAN IMPLEMENTATION

The first annual "Wellness Check" of a Wastewater Treatment Plant was conducted since beginning a focused effort on improving the resiliency and stability of the plant's secondary treatment system. It revealed tremendous improvements since new control measures were implemented.

BACK STORY:

One year earlier, the treatment plant was struggling to maintain consistent performance. Final effluent failed a WET (Whole Effluent Toxicity) test and exceeded a one-day BOD (Biological Oxygen Demand) limit within a six-month period. The Wellness Check facilitated by Paul Klopping (Callan & Brooks) indicates that the treatment plant operation is more stable than it was a year earlier. The mill passed their most recent WET test without issue and BOD discharges are consistently less than 25% of the permit limit. This improvement is the combined result of operational control improvements made by the operators at the treatment plant and improved communication and awareness within the mill.

The treatment plant is comprised of three main components: Primary Treatment, Secondary Treatment, and Sludge Dewatering. Primary Treatment removes the suspended solids (fiber, fillers, etc.) from the mill effluent. The Secondary Treatment portion of the treatment plant is a "living, breathing system" filled with millions upon millions of microorganisms (bacteria or "bugs"). The bacteria break down the dissolved contaminants in the mill wastewater to ensure that the discharge from the treatment plant does not have a negative or toxic impact on the Wisconsin River. The health of the microorganisms at the treatment plant is directly related to the eight key growth pressures identified below.

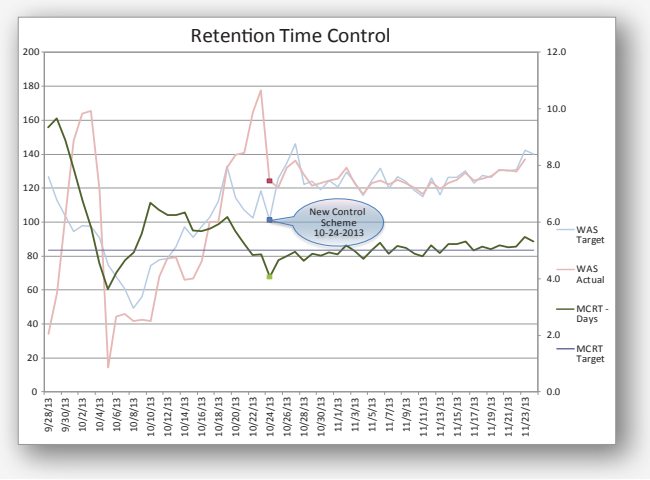


Efforts over the previous year focused on controlling the eight key growth pressures. Some of these growth pressures are best managed at the treatment plant, some of them can be managed at the mill, and some require a concerted joint effort.

Treatment plant operators implemented new operation control strategies focused on:

- Retention time (age of the bacteria),
- Nutrients (phosphorus and nitrogen),
- Temperature (spray cooler reliability),
- Activity and Viability (onsite and offsite analysis coordinated by MTS), and
- Dissolved oxygen (maximize bacteria exposure to aeration)

The green line in the graph below is one example of how stability at the treatment plant has improved since these control measures were instituted.



Mill efforts have focused on reducing the volume of Toxic Inhibitory Compounds (TICs). These compounds include:

- Quaternary amines
- Non-ionic surfactants
- Dispersants
- Terpenes
- Resin acids
- Biocides
- Petroleum (lubricating oils)

These compounds are found in cleaning agents, raw materials, and additives used in the manufacturing of paper or are byproducts from pulping operations. The key to success is to minimize the amount of these materials that make it to the treatment plant.

New control plans for both monitoring and control of the COD (BOD) loadings and pH upsets were implemented. These control plans focus on trigger points and good communication between the pulp and power shift managers, load dispatchers, and the treatment plant operators to manage upset conditions that could severely impact the "bugs" at the treatment plant or result in a permit exceedence.

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UPDATE:

The aforementioned efforts dramatically improved the operation at the treatment plant. These efforts must be sustained and improved upon in order to ensure compliance. Additional efforts in the upcoming year will focus on:

- Continued work to mitigate impact of TICs in mill chemicals
  - Communication with suppliers
  - Reduction of use and loss of key contributors
- Improved nutrient management at treatment plant
  - Upgrade ammonia system (safety and control)
  - Improve phosphoric acid system (regulatory requirement)

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