Horseradish Wastewater BOD

Client
The company is a manufacturer of multiple dip and sauce products. At one of their facilities their primary product is horseradish sauce. Horseradish roots are cleaned, ground into sauce, and packaged at this facility. Water is used to aid in cleaning and rinsing the roots before the grinding operation.

Opportunity Areas
The New York State Pollution Prevention Institute was asked to investigate the high biochemical oxygen demand (BOD) in their wastewater effluent. The BOD levels exceeded the limits for their local wastewater treatment facility.

Objectives
- Measure the BOD levels for the various processing steps in the system.
- Evaluate the facilities’ existing wastewater treatment methods

Work Performed
1. Water use was tracked for one day of production. For root cleaning in particular, the water meter was read at the beginning and end of each wash cycle.
2. TOC (total organic carbon) was initially measured in root cleaning wastewater and equipment cleaning wastewater. Two potential alternatives; centrifugation and 25 micron filtration were also tested for TOC.
3. The facility’s wastewater settling tank system was evaluated for effectiveness using TSS (total suspended solids), BOD, and soluble BOD measurements.

Results
1. The primary water use was in the root cleaning operation. This process accounted for 93% of the total water use.
2. The two high level sources of organics as measured by TOC were in the root cleaning operation and in end-of-day equipment cleaning. The root cleaning had a 0.16 wt% TOC level while the equipment cleaning had 2.12 wt% TOC. The organic loading for the equipment cleaning was high but contributed very little to the total load due to the low water volume, less than 7% of the total water use.
3. The use of either centrifugation or 25 micron filtration was inconclusive for improving TOC.
4. The soluble BOD ranged from 58% to 72% of the total BOD for the root cleaning operation. The total BOD ranged from 672-1,050 mg/L. Therefore the soluble BOD is always greater than 50% of the total BOD.
5. The settling tank system was able to remove most of the suspended solids but had little effect on the soluble BOD (91% of the total BOD after the settling tanks).

Future Work
The sauce company will be evaluating two recommended improvements to their settling tank system. These changes may improve the TSS and the residence time which should also improve the total BOD levels. One improvement is to convert two of the three tanks into true settling tanks. The other is to pump from the upper level of the third tank rather than near the bottom.