Elimination Of Odors And Process Improvements In A Creamery Plant, Texas, USA With Eco-Cat™ Injection Into SBR's WWTP

Creamery Plant, Texas, USA Plant Description and Operational Issues

The creamery plant, produces butter products, including gourmet butter and unsalted butter. The waste water from the creamery flows into the WWTP, which consist of (two) 1 million gallon (3785m^3) SBR's. The SBR's effluent flows either into (two) 2.9 million gallon aerated lagoons, (10,978 m^3/lagoon) or is discharged into the local public WWTP.

Normally, effluent flows into the lagoons, where it is pumped as irrigation onto local farm lands. The WWTP has been receiving community odor complaints. The plant is normally operated at or below design flow capacity, but coincidently over influent COD design load consistently. This additional influent COD loading have caused the SBR's to run very low DO levels (.16-.25mg/L). The SBR's effluent flow into the lagoons have been suffering from low percentage removal of COD or TSS, which in turn has created low DO levels in the aeration lagoons.

- Max Flow Plant Design : 201,600 gpd or 763,056 lpd.
- Max COD Plant Design : 11,700 Lbs/Day or 6,955 mg/L per day.
- Specialty nonionic surfactants (synthetic & biological).
- Natural enzyme proteins.

Primary Project Objectives: Eco-Cat™ Injection Into SBR's

Monitor Eco-Cat™ ability to increase the transfer of dissolved oxygen into the North and South SBR's and it's "carry over effect" into the aeration lagoons. Observe the improvements in percentage removal of COD and TSS in SBR's and total plant removal (plant influent vs. irrigation effluent discharge). Monitor improvement in Lagoon Irrigation Effluent levels of COD, TSS, SS and DO-mg/LA baseline of measurements was established for the period 8/1/07 thru 8/20/07.

- Flow: the baseline average was for August 2007: 124,595 gpd or 471.64 m^3. vs. plant flow design of: 201,600 gpd or 763.12 m^3.
- Influent COD baseline average was in August 2007:10,701 Lbs/Day or 11,992 mg/L per day vs. COD plant design of: 11,700 Lbs/Day or 6,955 mg/L per day. However, there were 12 days in August which exceeded the design load, with a peak of 32,600 Lbs or 26,600 mg/L per day.

Eco-Cat™ treatment was begun on 8/21/07. Results from 8/21 thru 9/05/2007 were compared against the baseline period.

Comparison of Influent COD Loading:

- During the Baseline period of 20 days, COD design capacity was exceeded 40% of the time, with a peak of 32,633 Lbs/Day. The average daily COD load was 12,567 Lbs/Day.
- During the BOC Treatment period of 16 days, COD design capacity was exceeded 37.5% of the time, with a peak of 15,461 Lbs/Day. The average daily COD load was 10,037 Lbs/Day for this period.

Program Of EcoCatalyst® Injection Into SBR's

North SBR:

On 8/21/2007 20 gallons of EcoCatalyst® was added to a volume of 575,000 gallons or 2,177 m3. The COD-mg/l loading was 12,560. An additional 2.5 gpd (9.46 LPD) was added to maintain the constant level of Eco-Cat™ based on average flow of .108 MGD (410 m^3) with an average COD loading of 11,440 mg/L.

South SBR:

On 8/24 20 gallons of Eco-Cat™ was added to a volume of 575,000 gallons or 2,176.62 m^3. The COD Loading mg/l was 13,720. An additional 2.5 gpd (9.46 Liters) were added to maintain the constant level of Eco-Cat™ based on average flow of .108 MGD (m^3) with an average COD loading of 11,440 mg/L. The purpose of adding extra EcoCatalyst was to allow for the volume/loading retained in the decant cycle level in each SBR to produce rapid reaction of increased DO levels along with the breakdown of FOG's.

Creamery Plant, Texas, USA– Aerial View of SBR's and Aeration Lagoons



2-SBR WWTP's, 2-Aeration Lagoons

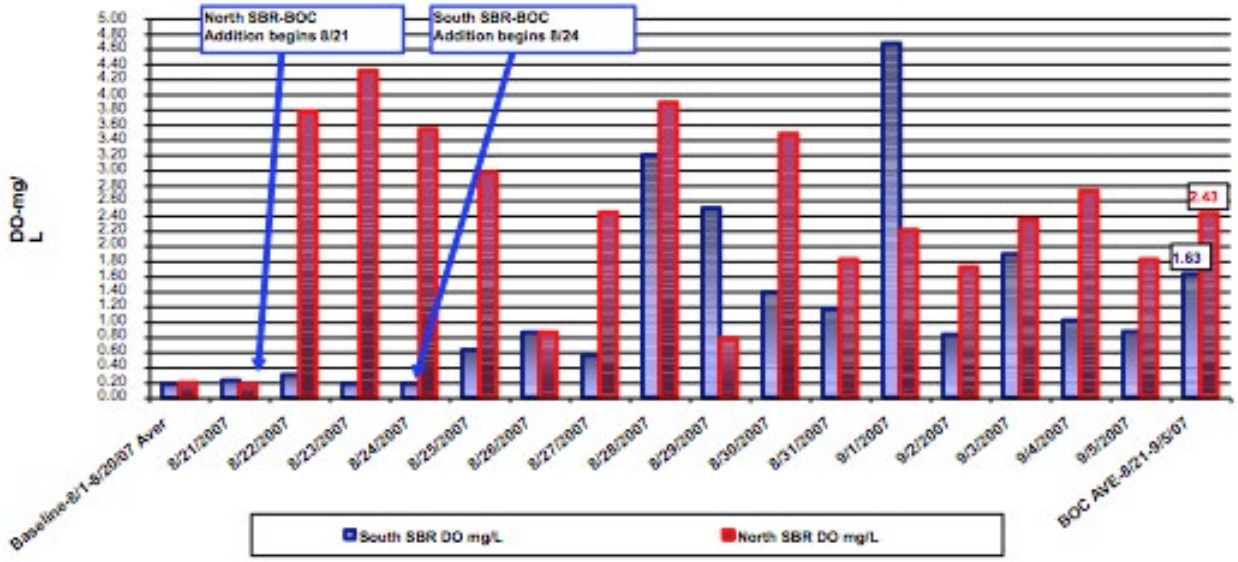
North and South SBR WWTP's



Two Aeration Lagoons



BOC's Effect On Increasing Dissolved Oxygen- mg/L Levels in North and South SBR's



The Benefits of Bio-Organic Catalyst Technology

- ***Solubilizes Organic Materials*** Increases bacterial food source in wastewater Reduces volatile organics for odor control.
- ***Increases Aeration Efficiency*** By formation of *microbubbles,* which reduces aeration energy cost and or increase DO increases biological activity, reduced sludge quantity Increases treatment plant capacity.
- ***Reduced Ammonia, BODs, via*** increased ionic interactions.
- ***Increases Ionic Interactions:*** Increases inorganic oxidation reactions Makes nutrients more available to bacteria.
- ***Activates Biomass for*** Rapid wastewater treatment.
- **Reduces volatile organics:** for odor control.
- **Increases Aeration Efficiency:** By formation of microbubbles, which reduces aeration energy cost and or increase DO increases biological activity, reduced sludge quantity and Increases treatment plant capacity.
- **Increases inorganic oxidation reactions**. Makes nutrients more available to bacteria

BOC Technology Breakthrough With Solubilization Of Lipids:

Solubilization of fats, oils, and greases (FOGs). This is an accelerated natural catalytic process in which lipid ester bonds are rapidly cleaved, reducing their molecular structure to both glycerol and fatty acids.

Glycerol and fatty acids are then readily available to wastewater micro-organisms as a high-energy food source of carbon for enhancement of nitrification and de-nitrification reduction processes.

Results Of EcoCatalyst® Injection- 8/21 Thru 9/5/07 Vs. Baseline Of 8/1 Thru 8/20/07 In SBR's

Influent Flows:

- Were down over baseline by approximately 13% (108,319 gpd Vs. 124,495^{GPD}).

Influent COD:

- However, was only down over baseline by approximately 6% (11,440 mg/L vs.12,229 mg/L).

North SBR

DO (Dissolved Oxygen) Levels Increased Rapidly:

- DO: 1215% Increase over baseline. (.2 mg/L to 2.43 mg/L)

COD Removal Rate:

- Improved from baseline of 64.6% to 91.1 %. COD Average decant lbs/day: reduced from 3,653 to1,364.

TSS-Removal Rate:

- Improved from baseline of 54.6% to 74.8 %. TSS- average decant lbs/day: reduced from 1281 to 821.

South SBR

DO: 906% Increase over baseline. (.18 mg/L to 1.63 mg/L).

Removal Rate:

- Improved from baseline of 51.7% to 87.9%.

COD Average Decant Lbs/Day:

- Reduced from 4,565 to 1,654.

TSS - Removal Rate:

- Improved from baseline of 65.7% to 88.4 %.

TSS - Average Decant Lbs/Day:

- Reduced from 1,000 to 350.

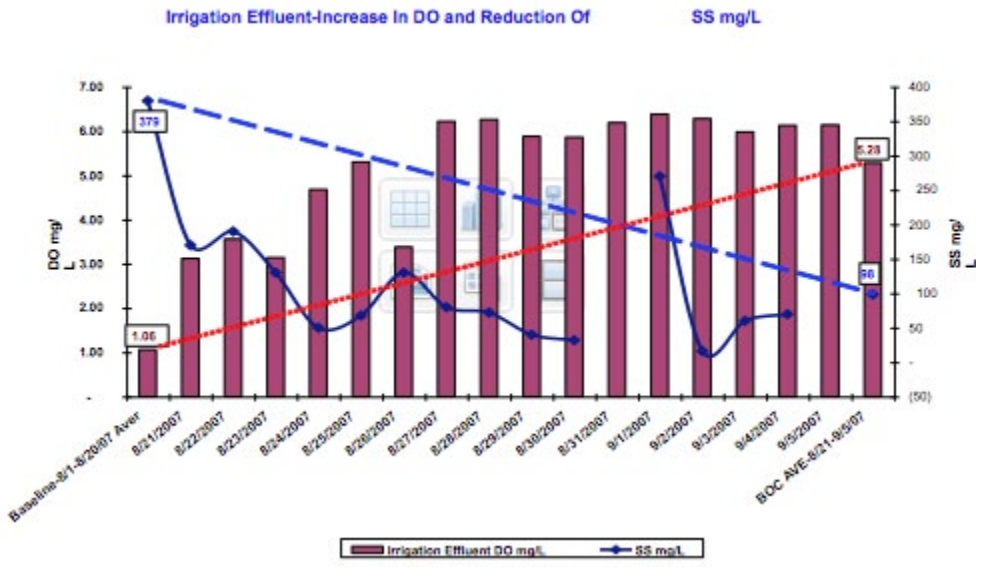
Overall Plant Removal Rates of COD And TSS (Plant Influent vs. Irrigation Effluent):

- COD Improved from 89.7% To 97.3%.
- TSS Improved from 85.7 to 96.9%.

The "Carry Over Effect" From SBR's into the Aerated Lagoons:

- **Irrigation Effluent DO-mg/L:** Increase over baseline (1.06 mg/L to 5.28)
- **Irrigation Effluent SS mg/L:** Decreased from baseline (379 mg/L to 98)
- **Reduction of Irrigation Effluent COD-mg/L:** Decreased from baseline (1027 mg/L to 294)
- **Reduction of Irrigation Effluent TSS-mg/L:** Decreased from baseline (387 mg/L to 106)

Irrigation Effluent - Increase In DO and Reduction Of SS mg/L



Observations By WWTP Staff
(One Week After EcoCatalyst® Injection Begin - Week ending 8/26)

- BOC's are used to treat the SBR's for odor reduction and increase of DO. Odors were not an issue this past week.(week ending 8/26).
- Dissolved oxygen levels in both units have taken a large jump this past week with the BOC. The highest recorded value this week was 4.31 mg/L although the average was 1.32 mg/L.
- They were irrigating from the south lagoon. They have been decanting to the north lagoon from the north SBR and decanting from the south SBR into the south irrigation lagoon.
- Odors from the south lagoon have ceased, DO has increased, and the color has greatly improved. As of 8/26, north lagoon DO is 6.81 mg/l; south lagoon DO is 3.38 mg/L.
- Both lagoons have cleared dramatically in the past few weeks.

Summary Of Results With EcoCatalyst® Injection

Dissolved Oxygen Increases:

In spite of COD overloading issues, the North SBR DO mg/L improved by 1215% (baseline average .20 to 2.43 mg/L, with a peak of 4.31 with BOC treatment. The South SBR DO mg/L improved by 906% (baseline average .18 to 1.63 mg/L, with a peak of 4.67 with BOC treatment.

SBR Removal Rates Performance Improved:

- North SBR COD- Removal Rate: Improved from baseline of 64.6% to 91.1%.
- South SBR COD-Removal Rate: Improved from baseline of 51.7% to 87.9%.
- North SBR TSS-Removal Rate: Improved from baseline of 54.6% to 74.8%.
- South SBR TSS-Removal Rate: Improved from baseline of 65.7% to 88.4%.
- Overall Plant Removal Rates Of COD And TSS (Plant Influent vs. Irrigation Effluent): COD Improved from 89.7% To 97.3%, and TSS Improved from 85.7 to 96.9%.

Lagoons DO and Removal Rates Improved:

- Effluent DO mg/L: Increased from 1.06 to average of 5.28.
- Effluent SS mg/L: Decreased from 379 to average of 98.
- Effluent COD mg/L: Decreased from an average of 1,027 to 294.
- Effluent TSS mg/L: Decreased from an average of 387 to 106.

Odors have been eliminated.

BOC Recommendations

Inject EcoCatalyst via pump into the each SBR (2.5 gpd into each SBR), rather than manual addition by hand. This will insure a more constant DO levels. The product is dose responsive and injection amounts can be varied accord to influent loadings.

- Allow the pumps injecting EcoCatalyst to maintain DO Level between 2.5 to 3.0 mg/L. This will give SBR's biology an opportunity to continue grow and stabilize. When the biology is stabilized, consider lowering DO levels to 1.5 to 2.5 mg/L. This potentially can lower aeration energy costs.
- This will also serve as a buffer for large Influent " shock loads of COD".