

INTRODUCTION

A prominent tortilla manufacturer was designing a new production facility using nixtamal (prepared maize) to produce tortillas. Prior to gaining approval for the new facility, it was imperative that Client submit a wastewater treatment plan for the permit. Specific design issues, such as fire roads and utilities, required careful planning with Client's full design team (electrical and mechanical engineers, production facility design crew, legal counsel, City regulators and general contractor).

**CHALLENGE**

Clean Water Technology, Inc. (CWT) was invited to work with Client's Team on establishing a wastewater treatment plan. CWT knew from experience that the nixtamal corn process would create a waste stream high in fats, oils and grease (FOG), total suspended solids (TSS) and dissolved and undissolved biological oxygen demand (BOD). While TSS and FOG are easily removed from the stream using CWT's **Gas Energy Mixing (GEM) System**, high levels of dissolved BOD and COD would remain. Along with the City, Client established a goal to reduce BOD levels from approximately 16,000 mg/L to less than 400 mg/L. To go above and beyond, Client set a further goal to achieve a BOD level of <250 mg/L to discharge to City.

SOLUTION

Through laboratory analysis of Client's wastewater from an existing facility, CWT's laboratory in Los Angeles, CA, provided Client with a treatability study and a plan of action. After visiting the site and evaluating the best treatment options for this facility, CWT proposed the GEM System followed by an **Upflow Anaerobic Sludge Blanket (UASB) Bioreactor, Aerobic Treatment and Clarification**.



CWT provided Client with the following wastewater train:

Pit/Sump → Existing Centrifuge → EQ Tank #1/pH Adjustment → GEM System → EQ Tank #2/pH Adjustment → 2 x Anaerobic Bioreactor (UASB) → 2 x Aerobic Bioreactor (Extended Aeration) → Clarifier → Water to City and Sludge to Client's Centrifuge

Client's centrifuge is used in place of a screen and removes the large solids from Client's production process. From the centrifuge, water is sent to a primary equalization (EQ) tank (EQ Tank #1) for homogenization of the stream and pH adjustment. From EQ Tank #1, water is sent to the GEM System for solid/liquid separation. The remaining water is sent to a secondary EQ tank (EQ Tank #2) where pH is again adjusted prior to the UASB Anaerobic Bioreactors. The Anaerobic Bioreactor is a tightly controlled biological non-oxygenated arena that, with the TSS and FOG already removed via the GEM System, can focus on digesting the soluble BOD/COD. From the Anaerobic Bioreactor, wastewater is sent by gravity to an Aerobic Bioreactors that allows bacteria to form for further reduction of the organic matter. The Aerobic Bioreactors are followed by a final Clarifier to remove the biosolids created during the aerobic BOD removal process.

PERFORMANCE PARAMETERS

TABLE 1: GEM System Effectiveness on Influent from Tortilla Facility, TX				
PARAMETER	BEFORE GEM	GEM OUTLET	ANAEROBIC OUTLET	AEROBIC + CLARIFIER OUTLET
BOD	16,000	10,000 - 11,500	2,500	<250
COD	20,000	15,000 - 18,000	5,000	<400
TSS	800	<60	150	<50

The removal rates of CWT's technology on the client's waste stream all had common themes: Best available treatment, lowest operational cost, ease of operation and reliability, smallest footprint and 100% Success.

ADVANTAGES

CWT's technologies prevailed over the many challenges presented where other technologies would have struggled. Client benefitted from:



THE GEM SYSTEM

- **Best flotation system – able to remove all non-dissolved materials**
- Great Dissolved Oxygen level left in the stream (0.9 – 8.0)
- Extremely Effective on High TSS and FOG Streams
- **Expandable in terms of loadings and flow**
- Reduced Sludge Hauling Costs due to Drier, Denser Sludge
- Decreased Use of Chemicals

ANAEROBIC BIOREACTOR (UASB)

- High organic removal capacity (80 – 90% of BOD/COD removal)
- Short hydraulic retention time
- Low energy demand
- Very reliable and easy to operate
- Minimizes the energy required in the next aerobic step
- The withdrawn sludge is completely digested and adequate for agricultural purposes or soil amendments



AEROBIC BIOREACTOR (EXTENDED AERATION)

- Produces high quality final effluent that does not require dilution for disposal
- Provides for good polishing step for treating effluent from Anaerobic Bioreactors (UASB)
- Produces high organic removal capacity (75 – 90% of BOD/COD)

CLARIFICATION

- Removes remaining solids that are formed during biological treatment
- Provides high quality effluent that goes to City



ECONOMICS

CWT's Full Wastewater Treatment

Solution helped Client develop treatment parameters, get permit with City on new plant development and successfully meet/exceed discharge requirements thereby reducing overall footprint and expected discharge costs using the most advanced and effective technologies by CWT.

