

### INTRODUCTION

A prominent tortilla manufacturer was designing a new production facility using nixtamal (grinding of corn) into tortillas. Prior to gaining approval for the new facility, it was imperative that Client submit a wastewater treatment plan for 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 requested to work with the Client's team on establishing a wastewater treatment plan. CWT knew from experience with the nixtamal corn process that the wastestream would be high in fats, oils and grease (FOG) and suspended solids (both dissolved and undissolved). While TSS and FOG would be easy to remove from the stream using CWT's **Gas Energy Mixing (GEM) System**, the stream was still going to have high levels of BOD and COD. 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 <150 mg/L.

### SOLUTION

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



Pit/Sump → Centrifuge → Primary EQ Tank/pH Adjustment → GEM System → Secondary EQ Tank/pH Adjustment → 2 x Anaerobic Reactor (UASB) → 2 x Aerobic Reactor → Clarifier → City

The centrifuge removes the large solids from their production process. From the centrifuge, water is sent to a primary equalization (EQ) tank for homogenization of the stream and pH adjustment. From the EQ tank, water is then sent to the GEM System for solid/liquid separation. The remaining water is sent to a secondary EQ tank where pH is again adjusted prior to the UASB Bioreactors. The UASB reactors provide a tightly controlled biological arena (without air) that, with the GEM System TSS and FOG removal, is able to focus on ingesting the soluble BOD. From the Anaerobic Digesters, water is sent to the Aerobic Reactors to form algae. The algae release oxygen to feed remaining aerobic bacteria which continue to break down the organic matter. The Aerobic System is followed by a Clarifier to remove the solids caused by the breaking down of the aerobic bacteria.

## PERFORMANCE PARAMETERS

TABLE 1: GEM 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 technology prevailed over the many challenges presented where other technologies would have struggled. The Client benefitted from:



### THE GEM SYSTEM

- **Best flotation system – able to remove all non-dissolved materials**
- Great Dissolved Oxygen level left on 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, specifically compared with a whole aerobic facility
- The withdraw sludge is completely digested and adequate for agricultural proposes or soil amendments



### AEROBIC REACTOR

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

### CLARIFICATION

- Removes remaining solids that are formed during biological treatment
- Provides high quality effluent that goes to the 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 footprint and discharge costs – with the most advanced and effective technology.

