



INTRODUCTION

Clean Water Technology, Inc., the creator of the Gas Energy System (GEM), provides the most advanced primary treatment system on the market. The GEM System provides superior reduction of total suspended solids (TSS), biological and chemical oxygen demand (BOD/COD), fats, oils and grease (FOG) and turbidity.

CHALLENGE

A principle food processor was searching for a sustainable wastewater treatment solution to the issues they were experiencing with their existing DAF (dissolved air flotation) System. Using their DAF to discharge 375,000 gallons per day with a variable flow range of 130-500 gallons per minute (246 avg.), the Client was faced with **high chemical costs, environmental surcharges and significant sludge removal costs.**

SOLUTION

CWT was contracted to demonstrate the GEM System’s capabilities in reducing TSS, FOG and BOD/COD, as well as to compare performance against the existing DAF system. A one-week demonstration period was conducted to evaluate the GEM System’s performance on the client’s waste stream and discharge.

During the demonstration period, CWT performed the testing using the following variations:

- GEM vs. DAF Performance (Results shown in Table 1 below)
- GEM Results using no chemistry (Results shown in Table 2 below)

TABLE 1: DAF vs. GEM Performance

PARAMETER	INFLUENT		EFFLUENT		% REDUCTION	
	DAF	GEM	DAF	GEM	DAF	GEM
TSS	813 ppm	813 ppm	297 ppm	83 ppm	63%	90%
COD	2,405 ppm	2,405 ppm	1,492 ppm	1,013 ppm	38%	58%
Turbidity	545 NTU	545 NTU	180 NTU	25 NTU	67%	94%

The existing DAF used 50% more polymer plus additional caustic and acid vs. the GEM System. Also, the GEM System removal rates were significantly better as shown in “% Reduction” in Table 1.

RESULTS

The GEM System achieved a greater overall reduction in TSS, COD and turbidity than the currently installed DAF System. Even those trials using NO chemical resulted in good contaminant removal rates.

The existing DAF System needed to run continuously to remain operational while the GEM System could be set up to run in a batch system (thus saving energy). Current DAF results were also very dependent upon pH which required continual monitoring and the addition of acid and caustic to maintain a pH of 5.5. The GEM System treated the water at a pH of 6.5 – 7.2 which gave client peace of mind that they would not end up with effluent below their allowable pH limit to the City (>5.0).

Operating with no chemical usage also provided higher reduction rates with the GEM System than the existing DAF.

TABLE 2: GEM System (No Chemical Usage)

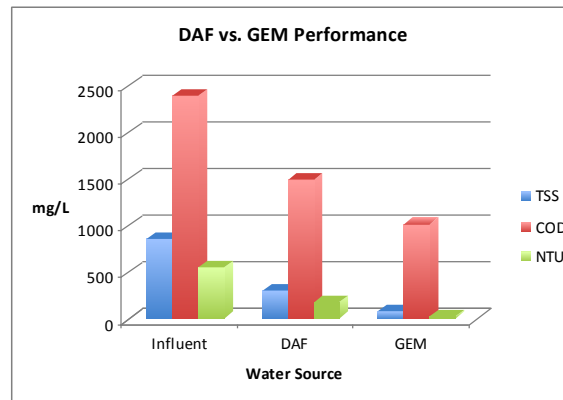
PARAMETER	INFLUENT	EFFLUENT	% REDUCTION
TSS	1,150 ppm	500 ppm	57%
COD	2,920 ppm	2,090 ppm	28%
Turbidity	1,400 NTU	722 NTU	48%

pH of 6.47 did not require adjustment for GEM

With all chemical regimes, the GEM System achieved significantly greater contaminant removal rates throughout the demonstration than the DAF unit, allowing the Client large potential savings on surcharges and fines.

Effluent averages from the GEM System using CWT recommended chemicals were:

- TSS: 83 ppm (90% Reduction)
- COD: 1,103 ppm (58% Reduction)
- Turbidity: 25 NTU (94% Reduction)
- BOD: 675 ppm (58% Reduction)



SLUDGE DATA

Although the GEM System and DAF system sludge results were closely related when taken directly off from the beach, the GEM System sludge obtained larger, stronger flocs than the DAF with significantly drier sludge which continued to decant over a number of days (See photos below). After 2.5 hours of decanting, the GEM System solids readily dewatered producing a sludge with significantly less water than DAF sludge resulting in reduced sludge operational costs readily dewatered producing a sludge with significantly less water than DAF sludge resulting in reduced sludge operational costs easily dewatered producing a sludge with significantly less water than DAF sludge resulting in reduced sludge **operational costs**.



GEM SLUDGE:
 - Forms Tight Flocs
 - Floats Independently
 - Naturally Dewateres



DAF SLUDGE:
 - Looser Flocs
 - Tend to Sink
 - Not Immediately Decantable



GEM TURBIDITY **DAF TURBIDITY**
 Same Treatment Regimen

CONCLUSION

Since installation in 2008, the Client has realized the following benefits:

- Significantly smaller footprint than conventional DAF's
- Substantially Reduced TSS, FOG and BOD/COD.
- Substantial sludge-related savings due to less and drier sludge production
 - Reduces sludge storage, hauling and disposal costs by 25-50%.
- Easy Operation with start/stop auto controls or continuous or batch run capabilities
- No capital expenditures required for growth in flow due to expandability of GEM System
- Reduced Chemical Usage



The Smart Water People
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