CASE STUDY: GEM SYSTEM & DAF SYSTEM SIDE BY SIDE COMPARISON

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 Frozen Food Manufacturer 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 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.

RESULTS

GEM Performance

COD			TSS			NTU			pH	(coag/cat/ani)
Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	7.28	(0/51/13)
2,412	1,013	**58%**	851	83	**90%**	507	25	**94%**		

Overall DAF System Performance

COD			TSS			NTU			pH	(coag/cat/ani)
Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	5.50*	(28/19/0)
2,405	1,492	**39%**	813	297	**63%**	545	180	**72%**		

GEM System - Reduced Chemical Dosing (100 NTU Set Point)

COD			TSS			NTU			pH	(coag/cat/ani)
Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	6.39	(0/5/0)
1,710	980	**43%**	850	250	**71%**	743	96	**87%**		

No Chemical Usage, Percent Reductions with No Chemical Dosing

COD			TSS			NTU			pH	(coag/cat/ani)
Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	Inf.	Eff.	**Red.**	6.47	(0/0/0)
2,920	2,090	**30%**	1,150	500	**61%**	1,400	722	**49%**		

*Average value of DAF pH controller currently installed on site

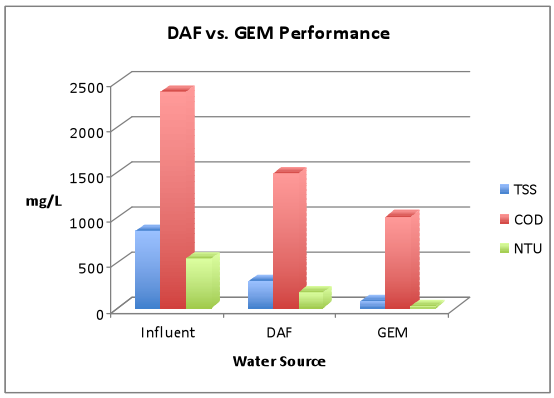
The GEM System achieved a greater overall reduction in TSS, COD and turbidity than the currently installed DAF System. Even those trials using NO chemical resulted in good contaminant removal rates. Furthermore, as chemicals were reduced to achieve 100 NTU, the GEM System consumed less chemicals and produced less sludge volume.

The existing DAF System must operate continuously, requiring wastewater to be constantly fed into the process in order for it to remain functional. Current chemical dosing practices requires that pH maintain a level of 5.5 to achieve best results. Since wastewater is constantly fed into the DAF System, large quantities of acid and caustic in addition to polymers must be injected into the process.

The GEM System can operate in a start/stop fashion. Various streams can accumulate over a 24-hour period in the EQ tank where water and pH is automatically homogenized requiring substantially less volume of acid and caustic.

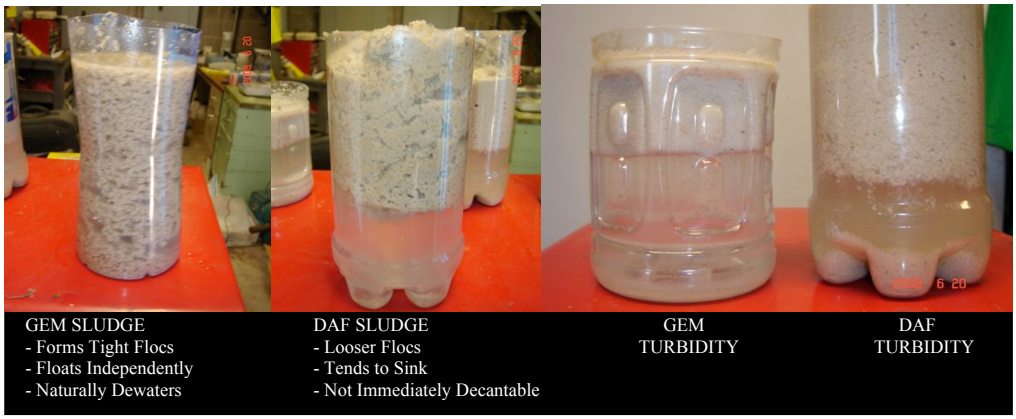
With all chemical regimes, the GEM System achieved significantly greater contaminant removal rates throughout the demonstration than the DAF unit, allowing the Client large potential savings on chemicals, surcharges and fines.

PARAMETER	DAF	GEM	TOTAL % REDUCTION
TSS	63%	90%	+27%
COD	39%	58%	+19%
NTU	72%	94%	+22%



SLUDGE DATA

Although the GEM System and DAF system sludge results were closely related when taken directly from the beach, the GEM System sludge obtained better flotation and water decanting than the DAF system sludge, as indicated in the photos below. After 2.5 hours of decanting, the GEM System solids consumed 5% of the container, leaving the remaining volume for easily decanted clean water. Furthermore, with the GEM System, there was no sludge carry over back to the treatment process as is more common with traditional DAF systems.



Sludge	@ 0 hours	@ 4 hours
DAF	**5.82%***	**5.82%***
GEM	**6.44%***	**14.60%***

*Results indicated as % solids by weight.

CONCLUSION

When the GEM System is installed in late 2008, this Client will realize the following benefits:

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