

CASE STUDY

OHxyPhogg® - Harrison, OH



Pilot Test Demonstrates Fogging System Effective in Eliminating FOG

Overview

The Harrison Wastewater Treatment Plant is a 2.3 MGD average daily design flow wastewater plant servicing the City of Harrison in Southwest Ohio.

During the pilot testing, the plant was receiving an average flow of approximately 1.9 MGD. Due to local industries and residential waste, the influent wastewater to the Harrison plant frequently experiences a high Fat, Oil, and Grease (FOG) load.

This can lead to a surface accumulation of approximately one foot in the 31'L x 8'W x 30'D influent well which is removed monthly to reduce the interference the FOG buildup creates with existing machinery and float switches.

Solution

Parkson Corporation with the permission of the City of Harrison tested Parkson's new OHxyPhogg® odor control technology at the plant for two weeks in May 2011. The system demonstrated it can essentially eliminate FOG buildup without the addition of chemicals eliminating the need to remove surface buildup monthly. The tests also showed that the FOG did not congeal downstream and did not affect downstream process in the oxidation ditch plant.

Story

Currently, raw wastewater influent flows into an Influent Pump Station (IPS) wet well as it enters the plant. From the wet well, the wastewater proceeds to the vortex grit removal handlers and then to a dedicated Grease Removal Tank

(GRT). The GRT utilizes air flotation of grease, however, the wet well is performing the function of a grease trap where the FOG buildup can be observed collecting within a day of removing the grease and cleaning the well. Plant personnel state, on average, a foot of buildup occurs every 4 to 6 weeks. The current practice is to remove the FOG using a vacuum truck monthly.

Pilot Test

Influent and effluent grease concentrations were recorded weekly in April and daily from May 3rd through May 8th and on May 10th. Composite influent samples were taken from a manhole directly upstream of the well and composite effluent samples were taken directly after the wet well in the screenings building.

Taking composite samples as opposed to grab samples yielded a higher degree of accuracy for calculating the amount of FOG that would remain in the well. Samples were taken by plant personnel per standard sampling procedures and the analysis was conducted by an independent laboratory.

Please refer to Table 1 and Table 2 for a summary of the results. The total amount of FOG retained in the IPS wet well during the 7-day pilot test would have been approximately 3,500 lbs (Table 2). This amounts to 62 cubic feet* of FOG that entered the well and should have accumulated on the surface had the OHxyPhogg® not been utilized. FOG totals were calculated based on composite samples over the course of 24 hours and also by the influent flow totals that were recorded by the plant.



*Assuming a FOG density of 56.4 lb/ft³ (900 kg/m³)

Table 1: Influent FOG concentrations BEFORE OHxyPhogg® trial - APRIL

Date	Influent FOG Concentration, mg/L	Effluent FOG Concentration, mg/L	Average Plant Flow, MGD	FOG Entering Well, kg/day (lbs/day)
Tue 4-5-11	25.6	ND	0.940	91 (201)
Tue 4-12-11	15.9	ND	1.172	70 (155)
Tue 4-19-11	32	ND	1.718	208 (458)
Tue 4-26-11	14	ND	1.690	89 (197)
April Average	21.88	ND	1.380	114 (252)

Table 2: Influent FOG concentrations DURING OHxyPhogg® trial - MAY

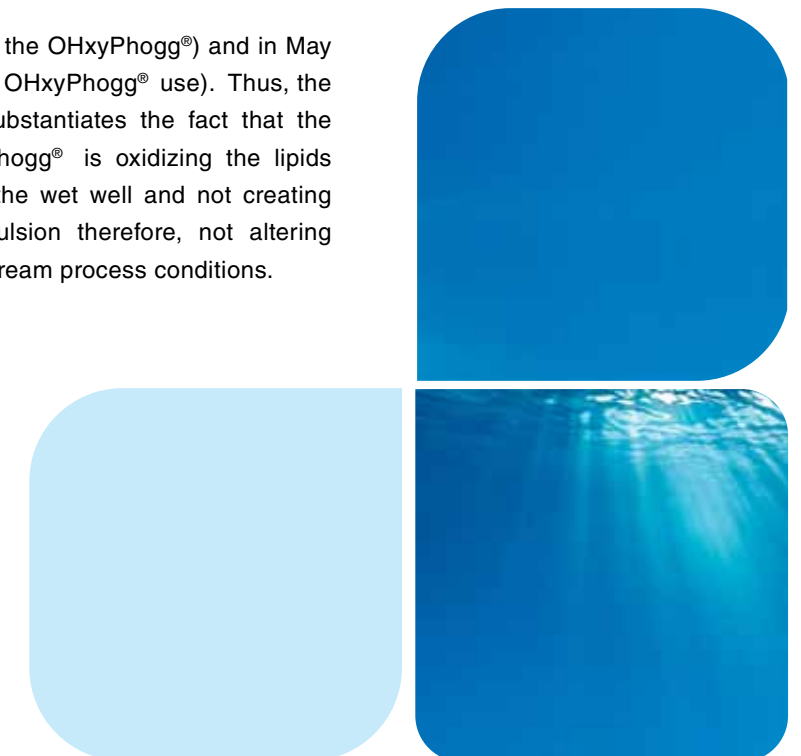
Date	Influent FOG Concentration, mg/L	Effluent FOG Concentration, mg/L	Average Plant Flow, MGD	FOG Entering Well, kg/day (lbs/day)
Tue 5-3-11	24.20	ND	1.661	152 (335)
Wed 5-4-11	15.40	ND	2.227	130 (287)
Thurs 5-5-11	57.90	ND	2.512	551 (1,215)
Fri 5-6-11	12.4	ND	2.056	97 (214)
Sat 5-7-11	46.0	ND	2.019	352 (776)
Sun 5-8-11	25.2	ND	1.830	175 (386)
Tue 5-10-11	22.8	ND	1.580	137 (302)
Test Period Average	29.13	ND	1.984	228 (502)

It can be stated with a high degree of confidence that during the May trial the FOG concentration entering the wet well was greater than in April.

On May 5th, the FOG concentration was exceptionally high and it is known this level occurs sporadically. However, even with higher FOG levels entering the wet well, the OHxyPhogg® was able to oxidize the FOG and prevent any further buildup.

It is important to note that plant effluent concentrations of FOG remained “Not Detectable” (ND) before and after the pilot test began, which is clearly evident from the fat concentration averages in April

(before the OHxyPhogg®) and in May (during OHxyPhogg® use). Thus, the data substantiates the fact that the OHxyPhogg® is oxidizing the lipids within the wet well and not creating an emulsion therefore, not altering downstream process conditions.



Before OHxyPhogg® Treatment

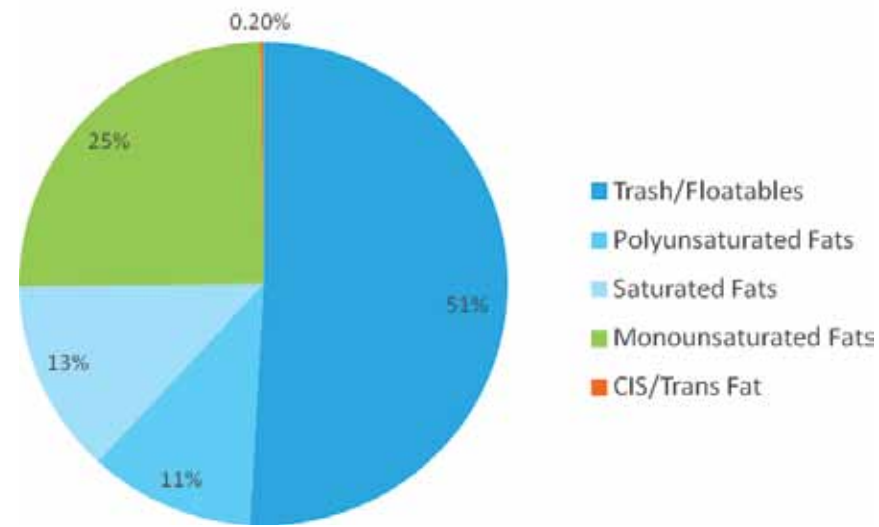


Figure 1: FOG Composition (by % of 50g sample, surface of grease layer)

After OHxyPhogg® Treatment

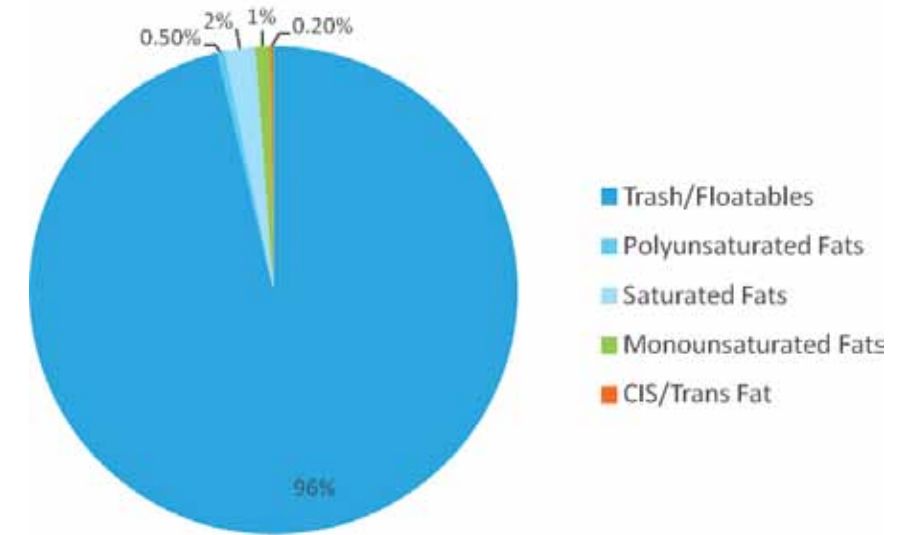


Figure 2: FOG Composition (by % of 50g sample, surface of grease layer)

Figure 1 and Figure 2 show sample compositions before and during the trial, respectively.

Total Fat was 49% of the sample collected prior to starting the test.

Four days after energizing the OHxyPhogg®, a second sample was collected at the same location and the Total Fat decreased to 3.7% of the sample.

This was a 92.5% decrease in fat confirming the OHxyPhogg® is oxidizing the surface FOG.



FOG Composition Analysis

FOG composition was analyzed two times during the pilot test by an independent laboratory.

Under the supervision of plant personnel, the samples were taken from the surface of the grease layer that was in direct contact with the OHxyPhogg® treatment.

The results show a significant decrease in the amount of fat present in the wet well.

Lower levels of FOG also correspond to lower amounts of volatiles and floatables (non-oxidizable) materials since there is less grease to buoy those to the surface of the water.

However, a small percentage of these items will invariably continue to collect in the well.

FOG Measurement

Phase 1

A photographic log of the progress of the grease reduction was recorded. Plant personnel estimated from visual observations that the majority of the grease layer was between 5 and 10 inches.

The FOG-water boundary is evident in Day 1 before the OHxyPhogg® was installed. The same boundary does not substantially move in the pictures of Day 5 and Day 11, although, 3,500 lbs of FOG entered and retained in the influent well.

This estimate does not include floatables and volatiles that add to the FOG layer. Sixty two cubic feet (62 ft³) of grease, or a 3 inch thick layer on the entire surface of the process water, entered the well. This volume of FOG only accounts for 50% of the surface buildup.

By decreasing the FOG that holds the floatables together the total amount of buildup was drastically reduced. Furthermore, the sample taken prior to the trial was solid and very dense.

Once the OHxyPhogg® was energized the sample was in the process of being liquefied and less dense.

Harrison plant operators have historically observed FOG overtake the entire well in a very short time.

Yet, even after 11 days, we can see that the FOG boundary has not advanced any further in the well. This is strong evidence to claim that the OHxyPhogg® has prevented any further FOG from accumulating in the influent well.

Figure 3 is a picture that was taken 7 to 14 days after the well was cleaned. Notice the natural progression of FOG buildup without OHxyPhogg® use. Not only is no process water visible, the FOG looks clumpy and dense.



Figure 3: Historic picture of well taken between 7 and 14 days after cleaning

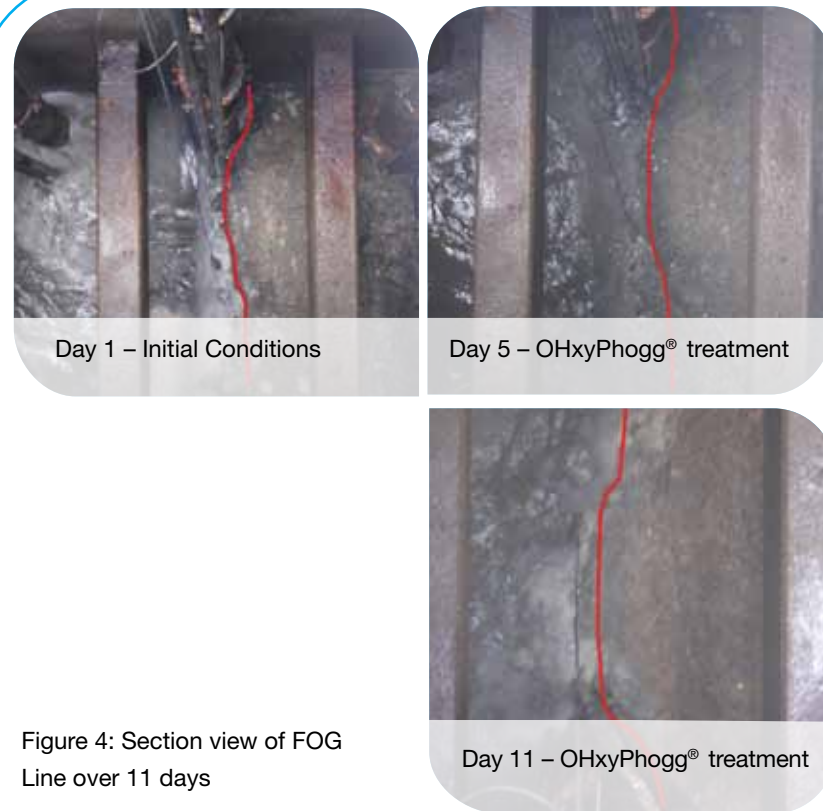


Figure 4: Section view of FOG Line over 11 days

Compare that picture with the pictures (Figure 4) taken during the trial and the process water is visible and the FOG layer does not seem dense.

The fact that the FOG boundary did not move over the course of 11 days is significant evidence that additional FOG buildup was prevented. The turbulence

of the influent water entering the well is not a factor in the center of the well, since it is clear that it historically does not stop FOG from completely covering the center areas of the well. Furthermore, no changes were made to the influent water entering the well, thus there should be no increase or decrease in the turbulence of the incoming flow.

Phase 2

Phase 2 commenced on May 12th, 2011, and continued until May 20th, 2011. During this phase of the pilot, a record of representative photographs was taken to form the basis of the data collection.

These photographs were then compared to photographs taken April 6th, 2011, five days after the April 1st, 2011 cleaning of the influent well.

This provided a baseline measurement to compare the FOG accumulation 5 days after cleaning the well, both with and without the OHxyPhogg® treatment. Refer to Figure 5 and Figure 6.

The estimated thickness of the FOG at the April 6th baseline was between 2 to 3 inches while the May 20th buildup was estimated at less than three-quarters of an inch (< ¾") and the sample was liquid.

A small amount of buildup will always remain due to the rate of FOG entering the well along with the floatables and volatiles.

But, as proven by the trial, the OHxyPhogg® can effectively oxidize surface FOG at the average rate of 502 lbs/day with spikes over 1,100 lbs/day.

For the trial, the nozzles were aimed at the wall closest to the ladder (the direction of flow) where FOG would start to collect and build up.

Consequently, the nozzle configuration was not optimal for



Figure 5: April 6, 2011 - 5 days after cleaning without OHxyPhogg® treatment



Figure 6: May 20, 2011 - 8 days after cleaning with OHxyPhogg® treatment

this application and can be improved to obtain maximum coverage and effectiveness.

In addition, only four nozzles were used during the trial where in actual implementation five nozzles would be highly recommended with nozzles placed at different locations to provide sufficient coverage.

Conclusions

Fats entered the well at an average rate of 502 lbs. per day, or 8.9 cubic feet per day with a spike of over 1,200 lbs. per day during Phase 1 of the trial while the FOG content in the process water leaving the wet well remained unchanged and undetectable once the trial commenced and continued throughout the entire trial.

Harrison plant personnel confirmed that the surface buildup would have eventually covered the entire wet well surface if the OHxyPhogg® was not in operation.

From independent laboratory analyses, surface buildup samples were compared before and after OHxyPhogg® use and there was a 92.5% reduction in Total Fat.

On a microscopic scale, this is consistent with OHxyPhogg®'s ability to oxidize and break down FOG while not affecting downstream processes in the plant.

The OHxyPhogg® technology proved that it can oxidize FOG, even at the extremely elevated FOG concentration levels experienced by the City of Harrison WWTP.

The trial was successful in demonstrating, visually and objectively, that it can drastically reduce the surface collection of FOG.



Furthermore, it can oxidize hydrogen sulfide, mercaptans, and other odorous compounds at the wet well therefore reducing odors in the well and surrounding areas.

Finally, since the OHxyPhogg® oxidizes FOG, there appeared to be no negative effect on downstream plant operations. ■



Fort Lauderdale
Chicago
Montreal
Dubai
Mumbai

1.888.PARKSON
odor@parkson.com
www.parkson.com