Freeport Sewer District

43 South Freeport Road

Freeport, Maine

Mast Landing Pump Station

137 Bow Street, Freeport, ME

Pilot Report

Vapex Environmental Technologies, LLC

March 7, 2017

Address

Vapex Environmental Technologies, LLC

2971-A Oxbow Circle

Cocoa, Florida 32926

USA

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1. BACKGROUND

The Mast Landing Pump Station located at 137 Bow Street, Freeport, Maine, is a 6-foot diameter wet well with one submersible pump. A Fats, Oils & Grease (FOG) blanket accumulates at the top of the influent at approximately 1-foot (1') every 4 weeks.

The normal operating procedures are to:

- Remove the FOG blanket with a vacuum truck monthly. If vacuum truck unavailable then:
- Clean the well with a water jet weekly beginning on week 4
  - Prevents FOG hardening (crusting) on the walls
  - Allows for proper float cable operation

Figure 1: Mast Landing Pump Station

Figure 2: FOG Buildup - 2 weeks after cleaning the well (Pre-Trial) – 1-25-17

2. Scope & Trial Objectives

The test was conducted at Mast Landing Pump Station located at 137 Bow Street, Freeport, ME. The pilot commenced on January 25, 2017 and ended on February 27, 2017.

The primary objective of the trial was to demonstrate the Vapex Radical Odor System significantly decreases the accumulation of Fats, Oils and Grease at Mast Landing Pump Station. The other objective was to appraise Freeport personnel's interaction with the Vapex unit specifically in operation and maintenance.

3. Trial Methodology

A Vapex NANO with two HV nozzles was used for the trial. Prior to starting the trial, the FOG was removed from the well using a vacuum truck. The procedures below outline the installation of the unit:

- The NANO was placed in the vault
- PVC piping was routed from the vault to the well.
- Water and oxidant tubing was routed through the PVC piping from the unit to the nozzle to protect from freezing.
- The nozzles were attached to the PVC piping
- The nozzles were placed a few feet above the high water line. This was done to ensure quick oxidation of the FOG.
- Unit was energized.

Figure 3: NANO in Vault – 1-24-17

Figure 4: Nozzle piping being routed from vault 1-24-17

Figure 5: Nozzle placement in well 1-25-17

Figure 6: Finished Installation 1-25-17

4. Data Collection

Data collection comprised of taking pictures periodically to assess the buildup of FOG as the trial progressed. A sample of the FOG layer was taken prior to cleaning the well. This sample was sent to a laboratory for FOG characterization.

5. Results

Jon McCabe of Freeport WWTP notified Vapex that during the duration of the pilot, the weekly water jet cleaning was not performed because the walls and cables did not have FOG buildup. Five days after the trial commenced on January 30, it was noted, the buildup of the FOG would have been typically greater and the water surface would have been seen in the well. The picture below was taken by Mr. McCabe on 1-30-17:

Figure 7: Trial Day 5 – FOG buildup results – 1-30-17

According to Mr. McCabe the FOG layer would have been 1 to 2 inches thick five days after cleaning the well. Further, he noted that the picture is deceiving because the fog layer is so thin it spread out throughout the well and this picture could not accurately capture the actual results he was seeing.

On February 16, twenty-two days after pilot commencement, Mr. McCabe stated that the walls were clean as were the cables and ladder. He noted that the water surface is seen though the picture does not accurately reflect it. Without treatment, the entire well would have been covered up with a FOG blanket that would be between 6 inches and 10 inches. Mr. McCabe took the picture below:

Figure 8: Trial Day 22 – FOG Build Up Results – 2-16-17

On the final day of the pilot, Mr. McCabe took another picture to document the results of the pilot. The picture shown below clearly shows that buildup did not occur.

Figure 9: Trial Day 33 (Last Day of Trial) FOG buildup results (2-27-17)

Once Mr. McCabe stopped the trial on 2-27-17, FOG started to reform. By the third day after conclusion of the trial, the FOG growth was clearly noticeable. See the picture below:

:

Figure 10: Three days after pilot completion – 3-2-17

In addition to the significant decrease in FOG buildup, Mr. McCabe stated he could not smell odors in the well.

The FOG characterization laboratory results are located in the Appendix. The results are the typical composition expected with approximately half being Unsaturated Fatty Acids and the other half being Saturated Fatty Acids. No other analysis was conducted on these results and no other conclusions were developed.

6. Conclusions & Recommendations

The pilot unit performed as expected and significantly decreased the accumulation of FOG above the water line. Additionally, the second objective was also achieved – Mr. McCabe did not encounter any issues operating or maintaining the machine and found the technology to be straightforward and easy to operate and maintain.

In a permanent installation, Vapex recommends the nozzles to be placed 180° away from each other and both nozzles slightly angled to one side to create a circular motion in the air. This will allow for more efficient oxidizing the FOG.

Overall, the pilot was successful and met the objectives set at the outset of the pilot.

MERIEUX NutriSciences

CERTIFICATE OF ANALYSIS

SILLIKER, Inc.
Gainesville Florida Laboratory
3437 SW 24 Ave, Gainesville, FL 32607
Tel. 352-372-0436 Fax. 352-378-6483

COA No:	GNV-39846488-0
Supersedes:	None
COA Date	2/28/17
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TO:
Mr. Travis Douglas
Engineering
Vapex Environmental Technologies
2971A Oxbow Circle
Cocoa, FL 32926

Received From:	Eustis, FL
Received Date:	2/14/17

Location of Test: (except where noted)
Gainesville, FL

Analytical Results

Desc. 1: FME-Pre
Desc. 2: Freeport Pre

Laboratory ID: 366890830
Condition Rec'd: NORMAL
Temp Rec'd (°C): 8.9

Analyte	Result	Units	Method Reference	Test Date	Loc.
Fat - Mojo, Acid Hydrolysis	13.53	% (w/w)	AOAC 950.54	2/23/17	
Fatty Acid Profile			AOAC 996.06	2/27/17	
6:0 Hexanoic (Caproic)	<0.10	% FA of Total FA			
8:0 Octanoic (Caprylic)	<0.10	% FA of Total FA			
10:0 Decanoic (Capric)	0.30	% FA of Total FA			
12:0 Dodecanoic (Lauric)	0.80	% FA of Total FA			
12:1 Dodecenoic	<0.10	% FA of Total FA			
14:0 Tetradecanoic (Myristic)	4.20	% FA of Total FA			
14:1 trans-Tetradecenoic	<0.10	% FA of Total FA			
14:1 Tetradecenoic (Myristoleic)	0.30	% FA of Total FA			
16:0 Hexadecanoic (Palmitic)	28.30	% FA of Total FA			
16:1 trans-Hexadecenoic	<0.10	% FA of Total FA			
16:1 Hexadecenoic (Palmitoleic)	2.00	% FA of Total FA			
18:0 Octadecanoic (Stearic)	11.90	% FA of Total FA			
18:1 trans-Octadecenoic (incl. Elaidic)	3.10	% FA of Total FA			
18:1 Octadecenoic (incl. Oleic)	33.00	% FA of Total FA			
18:2 trans-Octadecadienoic	0.10	% FA of Total FA			
18:2 n-6 Octadecadienoic (Linoleic)	13.80	% FA of Total FA			
20:0 Eicosanoic (Arachidic)	0.20	% FA of Total FA			
18:3 n-6 g-Linolenic	<0.10	% FA of Total FA			
20:1 trans-Eicosenoic	<0.10	% FA of Total FA			
20:1 Eicosenoic (incl. Gadoleic)	0.40	% FA of Total FA			
18:3 n-3 Octadecatrienoic (Linolenic)	1.20	% FA of Total FA			
20:2 n-6 Eicosadienoic	0.10	% FA of Total FA			
22:0 Docosanoic (Behenic)	0.10	% FA of Total FA			
20:3 n-6 8,11,14-Eicosatrienoic (gamr	<0.10	% FA of Total FA			
22:1 trans-Docosaenoic (Brassidic)	<0.10	% FA of Total FA			
22:1 Docosaenoic (Erucic)	<0.10	% FA of Total FA			
20:3 n-3 11,14,17-Eicosatrienoic	<0.10	% FA of Total FA			
20:4 n-6 Eicosatetraenoic (Arachidoni	0.10	% FA of Total FA			
22:2 n-6 Docosadienoic	<0.10	% FA of Total FA			
24:0 Tetracosanoic (Lignoceric)	0.10	% FA of Total FA			
20:5 n-3 Eicosapentaenoic (EPA)	<0.10	% FA of Total FA			

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Analyte	Result	Units	Method Reference	Test Date	Loc.
24:1 Tetracosaenoic (Nervonic)	<0.10	% FA of Total FA			
22:3 W3 Docosatrienoic	<0.10	% FA of Total FA			
22:4 n-6 Docosatetraenoic	<0.10	% FA of Total FA			
22:5 n-3 Docosapentaenoic	<0.10	% FA of Total FA			
22:6 n-3 Docosahexaenoic (DHA)	<0.10	% FA of Total FA			
Total SFA	46.00	% FA of Total FA			
Monounsaturated Total	35.60	% FA of Total FA			
Polyunsaturated Total	15.20	% FA of Total FA			
Total Trans FA	3.20	% FA of Total FA			