



## **Green N Clean**

# **Municipal FOG and Sewage Treatment Post-Summary Report**



**City of Coral Springs, Florida**  
**Public Works Department – Utilities Division**  
**Tom Costantino – Utilities Director**

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## Table of Contents

<b>1.</b>	<b>Introduction</b>	<b>3</b>
	• FOG Issues Today	3
	• Coral Springs Population Growth and Sewage FOG Impact	3
	• Utilities Department and <b>Green N Clean</b>	4
<b>2.</b>	<b>Green N Clean FOG Treatment Program</b>	<b>5</b>
<b>3.</b>	<b>Green N Clean Bioremediation Sewage Benefits</b>	<b>6</b>
<b>4.</b>	<b>Lift Station Overview Before <b>Green N Clean</b> Treatment</b>	<b>7-8</b>
<b>5.</b>	<b>Highlights of Treatment Program</b>	
	• H <sub>2</sub> S Odor	9
	• Major Reduction of FOG	10
	• Foreign Object Build-up (Last Cleaned)	11
	• Safety & Cost	12
<b>6.</b>	<b>Individual Lift Station Post-Results</b>	<b>13</b>
	• LS22B / LS22C / LS 21C / LS20B / LS13A	14-18



## Introduction: FOG Issues Today & Coral Springs, Florida

### FOG Issue Today



Fats, Oils & Grease (FOG) is a major problem today in operating a municipal sewage system. FOG obstructs floats and reduces the life of pumps leading to Sanitary Sewer Overflow's (SSO) and a need for frequent service. Obstruction of grease is the most prevalent cause of force main backups and sewage overflows, costing the industry billions of dollars annually. FOG causes majority of deposits found in lines and grease traps and require extensive physical cleaning to avoid blockages, odors, and the passage of grease in effluents to be re-deposited downstream.



In the US there are approximately 1.2 million lift stations in 5,789 municipalities. 75% of the sewer systems in the US work at only half capacity because of grease clogs. The increase in grease in sewer lines is a direct result of the growth of dual-income households who choose to eat out or take-out than cook at home. The clogging and congealment issues created by high FOG levels in the nations sewer districts equates to a \$27 billion problem that is not going away and in most jurisdictions is increasing exponentially.

### Coral Springs, FL – Population Growth and Sewage FOG Impact

In one decade, from 1980 to 1990, Coral Spring's population more than doubled. It continued to accelerate dramatically over the next 10 years by nearly 50%.



Population		Housing Units	
• 1980:	37,349		12,558
• 1990:	78,864	113.5%	29,398 134.1%
• 2000:	117,549	48.9%	41,137 39.9%
• 2010:	125,711	6.9%	43,975 est.
• 30 yrs:	236%		30 yrs 250%

Source: USA Census



Population growth, housing construction and retail/restaurant expansion over the past 30 years has resulted in heavy demands and pressure on Coral Spring's Public Work Utilities department to keep the increased demand of their sanitary sewer lines under control with the excessive amount of FOG and foreign objects being released into their sewage infrastructure. Also, with the economic recession in 2009 Florida municipalities budgets have been frozen or reduced putting pressure on public utility departments to find alternative solutions to ensure sewage quality control in their community.



## Coral Spring's Utilities Department and Green N Clean

January 2011, **Green N Clean** introduced their company services and products to the Utility Superintendent of Coral Springs, Tom Costantino.

In brief **Green N Clean** presented the following overview of their solution in treating municipal sewage FOG issues.....

***Green N Clean's** primary objective today is to help clean up the underground by focusing on municipalities, commercial industries and residential communities and the affect they have on our earth, air and waterways.*

***Green N Clean** creates and produces turnkey municipal sewage FOG programs that demonstrates the 100% efficacy of their eco-friendly bioremediation patented formula ingredients to treat FOG, H<sub>2</sub>S (hydrogen sulfide), TSS (total suspended solids) and BOD (biological oxygen demand) at restaurants, clogged sewage pipelines, lift stations and at the water treatment facility. Our patented solutions, 20 years' experience, accompanying by independent test results have proven that our product eliminates up to 98% of the FOG, while greatly reducing TSS, BOD and H<sub>2</sub>S levels not only at the source, but throughout the entire sewage infrastructure. This efficient, eco-friendly strategy is also part of what we see as a developing trend toward municipal-mandated pre-treatment programs for commercial users in sewer districts.*



***Green N Clean** also introduced the opportunity of developing a **NO FOG** program with Coral Springs to design a turnkey marketing initiative that educates and increases the awareness of the underground environmental issues to residential communities, food establishments and private sectors that proactively eliminates/reduces the FOG, foreign objects, toxic chemicals and raw sewage overflows that are being released into our waterways today.*



January – March 2011, Coral Spring's Utility Department and **Green N Clean** had several conference calls, emails and meetings to develop a municipal treatment program that achieved the following objectives and results.

1. Overall benefits of **Green N Clean**: lift station, sewer lines and water treatment plant. See Attachment "A".
2. Reduce/eliminate FOG directly at the lift station and not pushing downstream.
3. Reduce/eliminate H<sub>2</sub>S odor at the lift station.
4. Dose lift station with non-toxin bioremediation ingredients that are not harmful to the environment versus the toxic degreaser currently being used.
5. Demonstrate and support the quality health safety of using **Green N Clean** versus toxic degreasers with staff employees.
6. Cost effective program in the short and long term that is significantly less costly than toxic degreasers.
7. Introduce and work with the Utilities Department to implement a NO FOG program to the community of Coral Springs.

### Green N Clean Benefits

### Next Steps

#### Result

**Green N Clean** to commence a Coral Spring's municipal FOG treatment program at 5 lift stations from June 6<sup>th</sup>, 2011 to July 13<sup>th</sup>, 2011



## Green N Clean Municipal FOG Treatment Program

Five severe FOG-clogged lift stations were pre-determined by the Utilities department and treatment began on June 6<sup>th</sup>.

Each week all lift stations and upstream manholes were dosed with **Green N Clean's** lift station treatment product as per the schedule below.

Each week data information was recorded:

- FOG surface coverage %
- FOG and foreign objects coverage %
- H<sub>2</sub>S odor levels
- Comments and feedback from Coral Spring's Utility Department
- Photos and videos of each lift station

### The Goal

To achieve a successful post-analysis report in eliminating/reducing FOG and H<sub>2</sub>S odor at each lift station and define next potential steps.

Green N Clean Treatment Area	w/o June 6		w/o June 13		w/o June 20		w/o June 27	
	Oz/Day	Frequency	Oz/Day	Frequency	Oz/Day	Frequency	Oz/Day	Frequency
LS #21C - Church Parking Lot Manhole Upstream	8	3	8	3	8	2	8	2
	8	3	8	3	8	2	8	2
LS #22C - 8365 NW 24th St Manhole Upstream	8	3	8	3	8	2	8	2
	8	3	8	3	8	2	8	2
LS #22A - 6400 W Sample Rd Manhole Upstream	8	3	8	3	8	2	8	2
	8	3	8	3	8	2	8	2
LS #22B - Coral Lake Manor Manhole Upstream	8	3	8	3	8	2	8	2
	8	3	8	3	8	2	8	2
LS #20B - Golf Course Fairway Manhole Upstream	8	3	8	3	8	2	8	2
	8	3	8	3	8	2	8	2
	80 Mon, Wed, Fri		80 Mon, Wed, Fri		80 Mon & Thurs		80 Mon & Thurs	

Green N Clean Treatment Area	w/o July 4		w/o July 11	
	Oz/Day	Frequency	Oz/Day	Frequency
LS #21C - Church Parking Lot Manhole Upstream	4	1	4	1
	4	1	4	1
LS #22C - 8365 NW 24th St Manhole Upstream	4	1	4	1
	4	1	4	1
LS #22A - 6400 W Sample Rd Manhole Upstream	4	1	4	1
	4	1	4	1
LS #22B - Coral Lake Manor Manhole Upstream	4	1	4	1
	4	1	4	1
LS #20B - Golf Course Fairway Manhole Upstream	4	1	4	1
	4	1	4	1
	40 Mon or Wed		40 Mon or Wed	





## Green N Clean's Bioremediation Solution Sewage Treatment Program Benefits

### Lift Station Benefits



- Dramatically reduces sewer grease build-up
- Lowers electricity usage in pumps
- Reduces maintenance costs, man hours and over-time
- Eliminates the need for personnel to handle unsafe chemicals
- Dramatically reduces H<sub>2</sub>S odors
- Inexpensive, safe and easy to use
- Prevents sewage backup and reduces sludge production

### Sewer Line Benefits



- Dramatically reduces line blockages
- Improves flow
- Reduces maintenance costs, man hours and over-time
- Helps control noxious odors
- Eliminates the need for personnel to handle unsafe chemicals
- Eliminates/reduces line jetting / vac trucks for sewer grease control
- Lower grease disposal costs

### Water Treatment Plant Benefits



- Digests difficult compounds that are toxic to naturally occurring bacteria or existing generic bacteria
- Provides rapid breakdown of difficult-to-degrade substances and converts to carbon dioxide and water
- No modification of the current process required
- Low treatment cost. Increases efficiency of the treatment plant and saves energy costs.
- Odor control because of complete biodegradation of organic compounds
- Non-corrosive, non-pathogenic and low quantities of use, making it safe and easy to handle and store



# Lift Station Overview Before Green N Clean Treatment



- Population 554
- Retail 1,200 sq. ft
- Total Flows: 68,797 gpd
- Condos 341 units
- Peaked Flow 189 gpm



- Vac-Pump: Jan 11/11
- H<sub>2</sub>S Odor: low –medium @ 40%
- Surface Coverage: 90%
- Toxic Degreaser: May
- FOG Surface: 60%



- Population 1,253
- Condos 368 units
- Total Flows: 155,248 gpd
- Multi-Family 206 units
- Peaked Flow 403 gpm



- Vac-Pump: Jan 11/11
- H<sub>2</sub>S Odor: medium – high @ 75%
- Surface Coverage: 100%
- Toxic Degreaser: May
- FOG Surface: 60%



- Population 5,387
- Condos 195 units
- Retail 55,000 sq. ft
- Total Flows: 329,000 gpd
- Multi-Family 584 units
- Single Family 64 units
- Hospital and School Cafeteria
- Peaked Flow 734 gpm



- Vac-Pump: Jan 11/11
- H<sub>2</sub>S Odor: high+...most severe @ 100%
- Surface Coverage: 100%
- Toxic Degreaser: April
- FOG Surface: 50%



## Lift Station Overview Before Green N Clean Treatment



- Population 575
- Multi-Family 27 units
- Total Flows: 71,352 gpd
- Condos 91 units
- Single Family 115 units
- Peaked Flow 195 gpm



- Vac-Pump: May 12/11
- H<sub>2</sub>S Odor: medium @ 50%
- Surface Coverage: 40%
- Toxic Degreaser: March
- FOG Surface: 20%



- Population 1,186
- Retail: Publix Grocery Food Store and Plaza
- Total Flows: 147,060 gpd
- Condos 560 units
- Peaked Flow 383 gpm



- Vac-Pump: Jan 11/11
- H<sub>2</sub>S Odor: high @ 85%
- Surface Coverage: 95%
- Toxic Degreaser: April
- FOG Surface: 90%



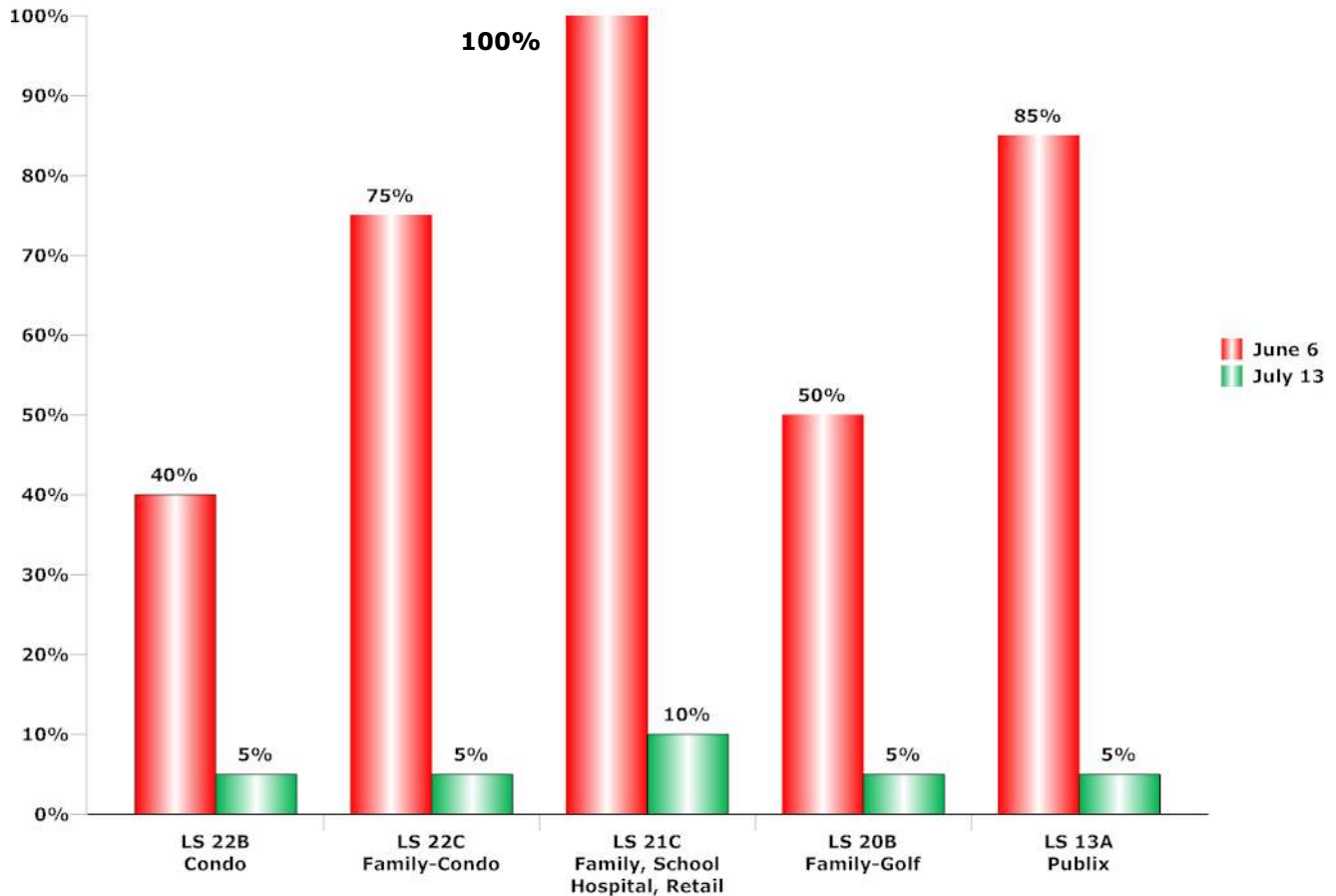
## Green N Clean Treatment Period: June 6<sup>th</sup> – July 13<sup>th</sup> Highlighted Post-Results

### #1. H<sub>2</sub>S Odor\*\* "NO FOG...NO ODOR" 91.4% Reduction

- Immediately (1-week), major reduction in H<sub>2</sub>S odor at all lift stations.
- In 5½ weeks, the reduction of H<sub>2</sub>S odor dropped more than 90% (91.4%).
- Most severe H<sub>2</sub>S odor lift stations, LS 21C and LS 13A, dropped 90% and 80% respectively

### Coral Spring's Lift Stations H<sub>2</sub>S Odor

High: 75-100  
Medium+: 50-75  
Medium: 25-50  
Low: <25



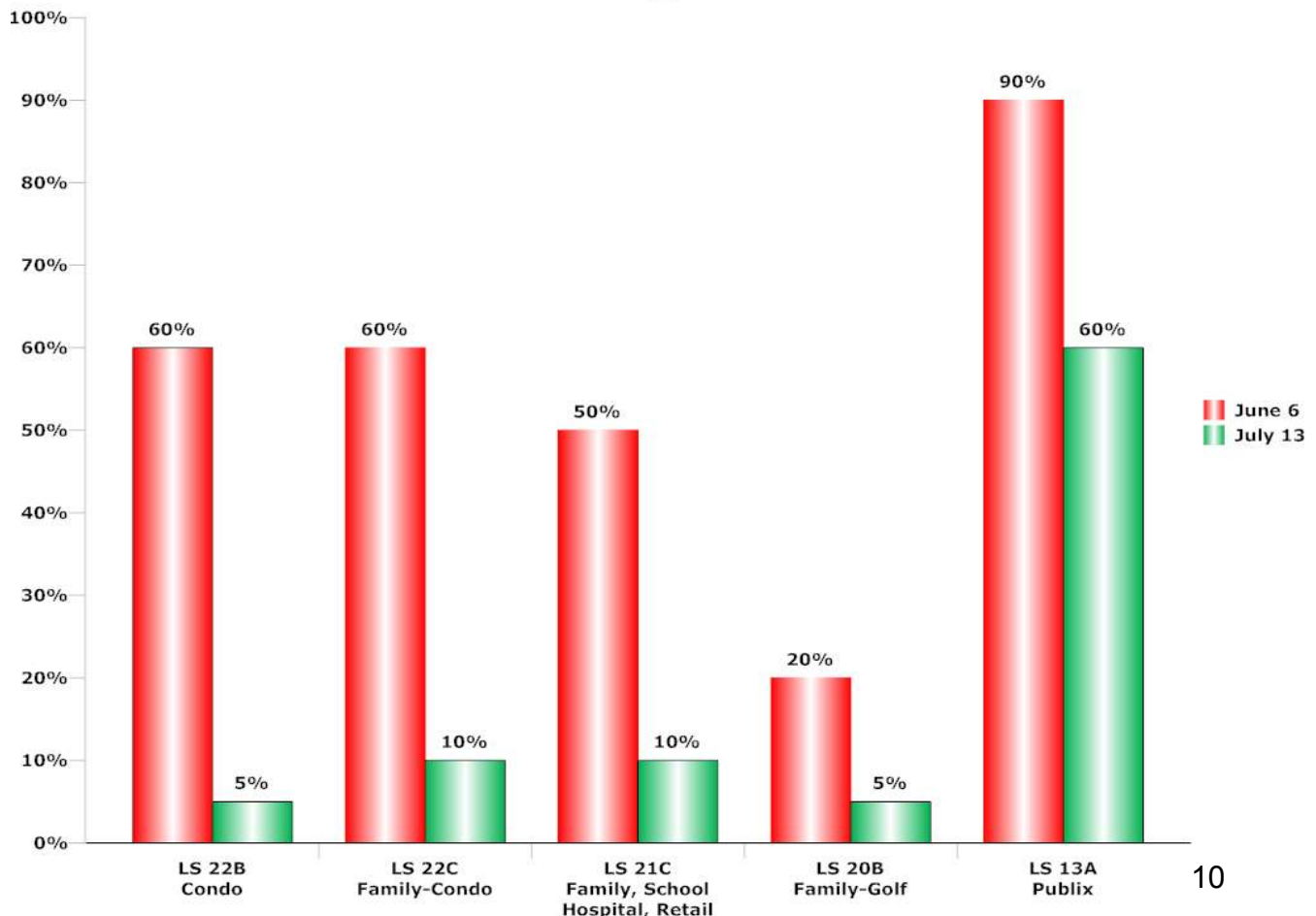
**\*\*H<sub>2</sub>S Odor:** Several factors can cause odors in lift stations, but Hydrogen Sulfide (H<sub>2</sub>S) tends to be the most common cause. Under turbulent flows and acidic conditions, H<sub>2</sub>S gas evolves from the liquid phase to produce highly unpleasant and potentially toxic odors. H<sub>2</sub>S can also be a source of significant corrosion problems.



## #2. Major Reduction of FOG “GNC NO FOG Program Works”

- June 6<sup>th</sup>, 4 of the 5-LS’s had a FOG surface coverage of more than 50% with LS 13A the most severe coverage of 90%.
- In 3½ weeks (June 29<sup>th</sup>), 4 of the 5-LS’s FOG surface coverage was 10% or less.
- LS 13A FOG coverage began showing significant reduction after week four.  
 Recommendations for future FOG reduction:
  1. 8 oz dosing x 2 days/week in the evening
  2. 30’ steel pole with shovel to be used to break-up FOG and increase oxygen flow which increases microbe digestion
  3. Introduce **Green N Clean** product to Publix for grease trap dosing

### Coral Spring's Lift Stations FOG Coverage Surface %

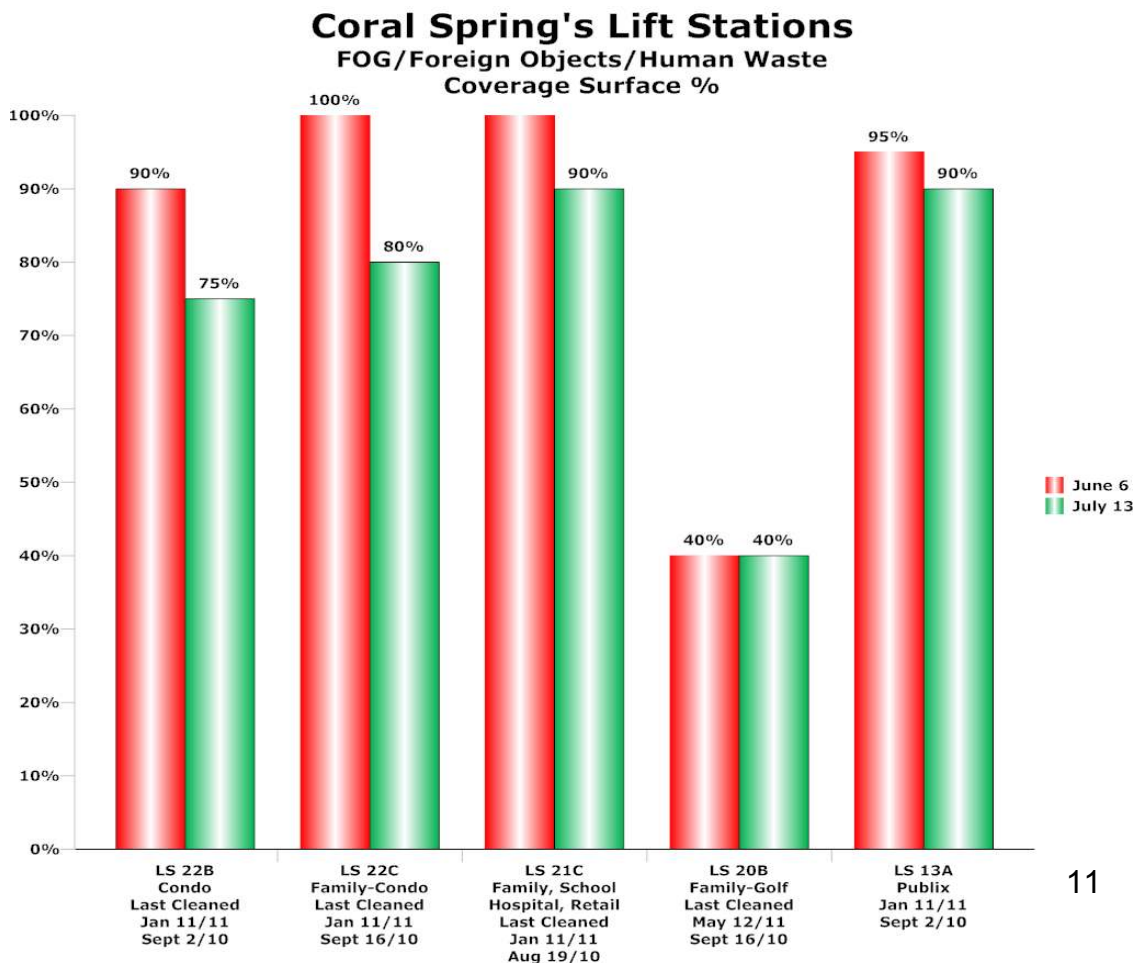




## Green N Clean Treatment Period: June 6<sup>th</sup> – July 13<sup>th</sup> Highlighted Post-Results

### #3. LS Last Cleaned: Foreign Object Build-Up "Introduce FOG or FROG Program to Communities"

- With the exception of LS 20B (golf course), 4-LS's had not been vac-pumped since January 11, 2011. Previous to mid-January, August-September 2010.
- With only toxic chemical degreasers being used from January to June (6 mths) the build-up of FOG and foreign objects achieved levels of 90%-100% surface coverage in 4 of the 5-LS's.
- **Green N Clean** reduced up to 92% of the FOG in the LS's, but due to the excessive amount of foreign objects in 4 of the 5-LS's the total coverage % decreased 10%-25%.
  1. **Green N Clean** recommends introducing a NO FROG Program
  2. **Green N Clean** recommends implementing a city ordinance by-law on FOG and foreign objects with the private sector, FSE's and residential communities
- May 12<sup>th</sup>, LS 20B was vac-pumped. Over the entire 6 week **Green N Clean** treatment program the percentage of FOG and human waste did not increase supporting the efficacy of **Green N Clean's** bioremediation product.





## #4. Safety and Cost “MSDS/Personnel/Environment” “Green N Clean Vs. Toxic Degreasers”

### Bioremediation Eco-Chemical



- 100% Eco...No toxic harmful chemicals
- 100% enzyme free
- Digests and converts up to 98% of FOG, BOD & TSS at the source, downstream, water treatment plant
- Reduces/eliminates H<sub>2</sub>S odor
- MSDS – safe around personnel

### Toxic Chemical Degreaser



- Hazardous toxic chemical – personnel & waterways
- Does not eliminate FOG at source and pushes problem downstream
- Masks odor in temporarily reducing H<sub>2</sub>S odors
- MSDS – difficult to handle in large toxic drums
- MSDS – product is ‘highly combustible’

### Cost Comparison



**Green N Clean**

**\$20-\$50 per 5 gallons**



**Toxic Degreasers**

**\$200-\$250 per 5 gallons**



**Siemens  
 Odor Control  
 (Air Filtration)**

**\$50,000 per unit  
 (estimate)**



## Individual Lift Station Post Results



### Important Green N Clean Benefit & Result



*Last 2 weeks of treatment program the dosing and frequency application was only one 4-8oz dosing wkly.*



### Result

*H<sub>2</sub>S Maintained its Minimal Level of Odor*



*FOG Accumulation Did Not Increase*



## Lift Station Post-Results: LS 22B



**June 6, 2011**

**H<sub>2</sub>S Odor: low-medium @ 40%**

**FOG Surface: 60%**

Surface Coverage: 90%

Vac-Pump: Jan 11/11

Toxic Degreaser: May

**July 13, 2011**

**H<sub>2</sub>S Odor: minimal odor @ 5%**

**FOG Surface: 5%**

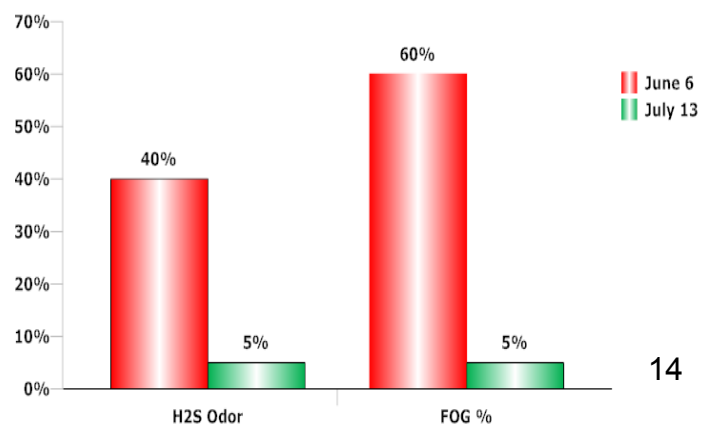
Surface Coverage: 75%



### Additional Notes:

- After 5½ weeks 95% of surface coverage was a collection of leaves, rags and other non-biological particles.
- FOG around sides and hoses completely gone.
- Due to the excessive amount of rags and other foreign objects in the LS recommend a No FOG program in the condominium community.

### Lift Station 22B Residential Community Condominiums



## Lift Station Post-Results: LS 22C



**June 6, 2011**

**H<sub>2</sub>S Odor: medium-high @ 75%**

**FOG Surface: 60%**

Surface Coverage: 100%

Vac-Pump: Jan 11/11

Toxic Degreaser: May

**July 13, 2011**

**H<sub>2</sub>S Odor: minimal odor @ 5%**

**FOG Surface: 10%**

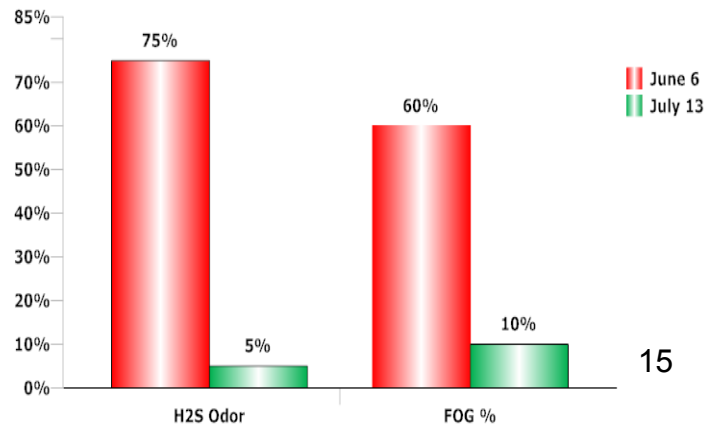
Surface Coverage: 80%



### Additional Notes:

- Reduction of FOG increased the visibility of rags and other foreign objects on surface.
- June 29<sup>th</sup>, FOG had nearly disappeared and chunks had fallen off the sides.
- July 6<sup>th</sup>, one long sheet of FOG came through the invert and July 13<sup>th</sup> it was gone.
- Another major residential community issue with not only FOG but dumping rags and other non-biological objects down their drain pipes. Recommend FOG Awareness Program.

### Lift Station 22C Family Homes Condominiums





# Lift Station Post-Results: LS 21C



**June 6, 2011**

**H2S Odor: high+ @ 100%**

**FOG Surface: 50%**

Surface Coverage: 100%

Vac-Pump: Jan 11/11

Toxic Degreaser: April

**July 13, 2011**

**H2S Odor: minimal odor @ 10%**

**FOG Surface: 10%**

Surface Coverage: 90%

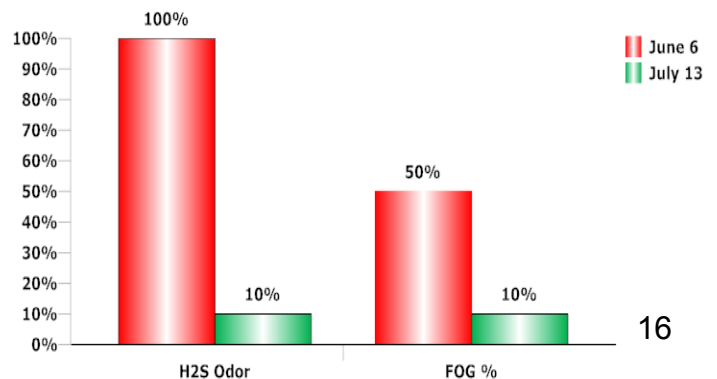
**No FOG. Foreign Objects**



## Additional Notes

- Most severe H2S odor LS but in less than 1-week the odor declined dramatically.
- Within 2-weeks the H2S odor was minimal.
- Odor continued to be minimal even the last weeks when dosing was only 1/week.

## Lift Station 21C Family, School Retail, Business Hospital



## Lift Station Post-Results: LS 20B



**June 6, 2011**

**H<sub>2</sub>S Odor: medium @ 50%**

**FOG Surface: 20%**

Surface Coverage: 40%

Vac-Pump: May 12/11

Toxic Degreaser: March

**July 13, 2011**

**H<sub>2</sub>S Odor: minimal odor @ 5%**

**FOG Surface: 5%**

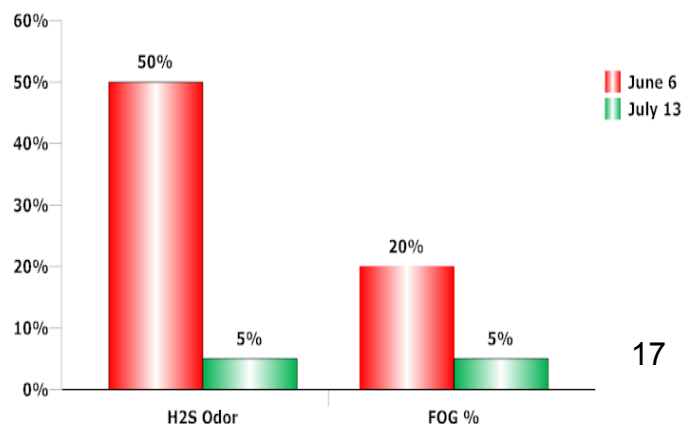
Surface Coverage: 40%



### Additional Notes:

- LS 20B was the only LS that had recently been cleaned out.
- The combined LS surface coverage of FOG, foreign objects and human waste never increased proving the treatment and efficacy of **Green N Clean**.
- LS 20B supports the creation of a **Green N Clean** Preventative Maintenance Program with the Public Utility Department of Coral Springs.

### Lift Station 20B Family Homes Golf Course



## Lift Station Post-Results: LS 13A



**June 6, 2011**

**H<sub>2</sub>S Odor: high @ 85%**

**FOG Surface: 90%**

Surface Coverage: 95%

Vac-Pump: Jan 11/11

Toxic Degreaser: April

**July 13, 2011**

**H<sub>2</sub>S Odor: minimal odor @ 5%**

**FOG Surface: 60%**

Surface Coverage: 90%



### Additional Notes:

- In less than 3 weeks the FOG thickness became lighter and softer and water ripples occurred when **GNC** product was poured into LS.
- July 6<sup>th</sup>, 2' x 4' layers of FOG removed from the sides of the LS.
- July 13<sup>th</sup>, all FOG layers from the previous week were gone and the metal pole shovel penetrated 80+% directly into water.
- Recommendation: Dose twice weekly (8oz) in the evening and introduce **GNC** to Publix and FSE's.

### Lift Station 13A Publix Grocery Plaza Condominiums

