Collection System Grease and Odor Problem Solution

New Jersey Water Environment Association
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1

A Common Lift Station

2

3

4

5

How to solve fats, oils and grease?

Control after FOG formation :

Vacuum truck – pump it out & pressure wash

Prevent FOG formation:

- **Degreasers**
  - **Chemical** – d-limonene, solvent based cleaners, surfactants
  - **Biological** – microorganisms, bacteria, biostimulants, enzymes, microbes, biooxidants, biocatalysts, etc. that break down long chain fatty acids
- **Mixing / agitation**
  - Create turbulence to achieve dispersion and keep grease suspended
  - Mixers, conditioning pumps or **air/bubbles**

6

Conditioning Pump

- Submersible chopper pump with a high-velocity mixing nozzle
- Recirculates the contents of the wet well to remove grease mats and prevent them from forming
- Re-suspends solids accumulated on the floor of the well
- 5 HP – 40 HP motor produces 400 GPM – 1800 GPM of flow

7

Wet Well Aeration System

8

The Aerator

- HDPE tube with internal baffles
- No corrosive parts
- 10 lb. stainless steel base
- Nylon reinforced 1“ EPDM air feed hose

9

The Air Source

- 1.5 HP high volume, 2-stage regenerative blower
- Available in any voltage or phase
- One blower can drive up to 4 aerators in larger wet wells

10

Gloucester Township, NJ
Sicklerville Pump Station

11

Princeton Sewer Department
North Ridge Pump Station

12

Township of Piscataway, NJ
Weldotron Pump Station

13

14

The aerator aggressively mixes the wet well with high volumes of ambient air

- Bubble cleaving baffles produce coarse bubbles that spin as they rise
- In addition to preventing the accumulation of grease, the aggressive action of the bubbles achieves high oxygen transfer
- The presence of dissolved oxygen prevents the formation of H_2S

15

What causes H_2S odors?

- **Sulfate (SO_4^{2-}), one of the most common anions in wastewater, is reduced to Sulfide (S^{2-}) by Sulfur Reducing Bacteria (SRB's) that colonize in the slime layer on submerged surfaces of sewer pipes**
- **The sulfide ion combines with hydrogen ions in the water to form hydrogen sulfide (H_2S)**
- **Dissolved H_2S is released to the atmosphere as H_2S gas**
- **H_2S produces the "rotten egg" smell that's characteristic of domestic sewage**

Source: EPA, Publication 832-R-92-001, "Detection, Control, and Correction of Hydrogen Sulfide Corrosion in Existing Wastewater Systems"

16

What causes corrosion?

Released H_2S gas combines with moisture on the non-submerged surfaces of the sewer pipe and is biologically oxidized to sulfuric acid by aerobic Thiobacillus bacteria living on the sewer walls

$$H_2S + 2O_2 \xrightarrow{\text{Thiobacillus bacteria}} H_2SO_4$$

Hydrogen Sulfide gas — Atmospheric Oxygen — Sulfuric Acid

Source: EPA, Publication 832-R-92-001, "Detection, Control, and Correction of Hydrogen Sulfide Corrosion in Existing Wastewater Systems"

17

How to prevent the formation of H_2S that causes odors and corrosion?

Provide an alternate source of oxygen for the sulfur reducing bacteria (SRB's).

- The aerator uses ambient air with 21% O_2 to prevent the conversion of sulfates to H_2S
- It sits on the floor of a wet well and injects 41 CFM of air from a 110 volt 1.5 HP blower into the well
- O_2 from the atmosphere serves as a substitute source of oxygen for the SRB's

18

To prevent odors, corrosion and FOG, wet wells need:

- Adequate mixing and agitation to keep grease dissolved and/or suspended
- Enough oxygen to prevent H_2S and acids from forming

19

With continuous high levels of oxygen and agitation –

- **H_2S odors will not occur**
- **Grease caps will not form**
- **Corrosion will be prevented**
- **Pump float switches won't get hung up or become fouled**
- **Vacuum trucks and frequent maintenance will be drastically reduced**

20

Chemical Alternative

H_2S Inhibitors / Sulfate substitutes:

Calcium nitrate – Bioxide, Hydrex 6035, AquaHawk HSX

Sodium nitrate – Nitra-Nox, GenClear N

- NO_3^- ion serves as a substitute source of oxygen for sulfate reducing bacteria (SRB's)
- *Prevents* the formation of H_2S by preventing the conversion of sulfates to sulfides
- Adds nitrogen to the wastewater
- Does nothing to prevent grease

21

Township of East Brunswick, NJ

Kingswood Pump Station

22

Township of East Brunswick, NJ

Ireland Brook Pump Station

23

Blower Covers

Open ended weather protective cover

Lockable fiberglass cover

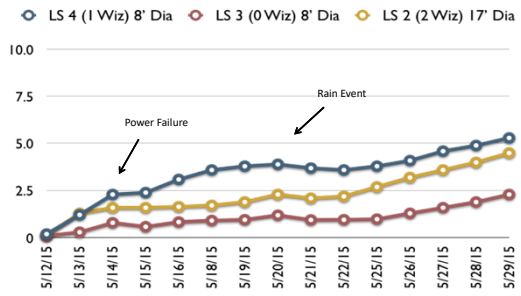
24

Village of Patchogue, NY
East Main Street Pump Station

25

***Wet Well WIZARD*™ Trials – Dissolved Oxygen (DO)**

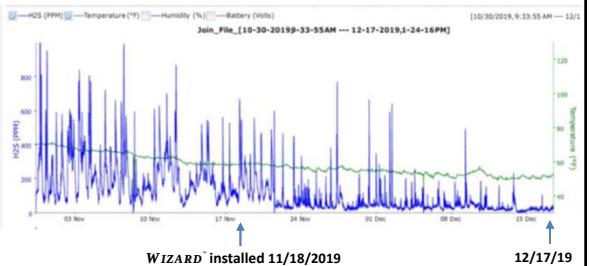
1. 4 miles from **LS #4** to **LS #3**; 0.9 miles from **LS #3** to **LS #2**
LS #4 had a 9" grease cap on 5/12 - No grease cap on 5/13
LS #2 had a 15" grease cap on 5/12 - No grease cap on 5/13



26

***Wet Well WIZARD*™ – Prince George County, VA**
Hydrogen Sulfide (H_2S)

10/30 – 11/21 Average H_2S ≥ 185 ppm
11/21 – 12/5 Average H_2S = 60 ppm
12/10 – 12/17 Average H_2S = 27 ppm
H_2S measured at a manhole 5.0 miles downstream of the Wizard



***WIZARD*™ installed 11/18/2019** **12/17/19**

27

Manasquan River Regional Sewer Authority
Farmingdale, NJ

28

Manasquan River Regional Sewer Authority

29

Manasquan River Regional Sewer Authority

30

Wayne County Water & Sewer Authority
Macedon, NY

31

Borough of Alpha,
Warren County, NJ

32

✓ WET WELL WIZARD

- Coarse bubbles keep fats, oils and grease in suspension
- Adds dissolved oxygen to the wet well – converts it from anaerobic to aerobic
- Prevents the formation of H_2S and H_2SO_4
- Eliminates odors and reduces corrosion in the wet well & downstream of the pump station

33

THANK YOU

Any Questions?

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34