

# WIPES! Designing for The New Reality



# What will you learn?

- How wastewater characteristics have changed in the age of WIPES and the impact on pump station design, maintenance, and operational resilience
- How to assess the true costs of current mitigation practices (capital costs, maintenance costs, impact on downstream operations and treatment efficiency)
- How Vaughan Chopper pumps and accessories can improve lift station performance and reliability in this new era of wipes.

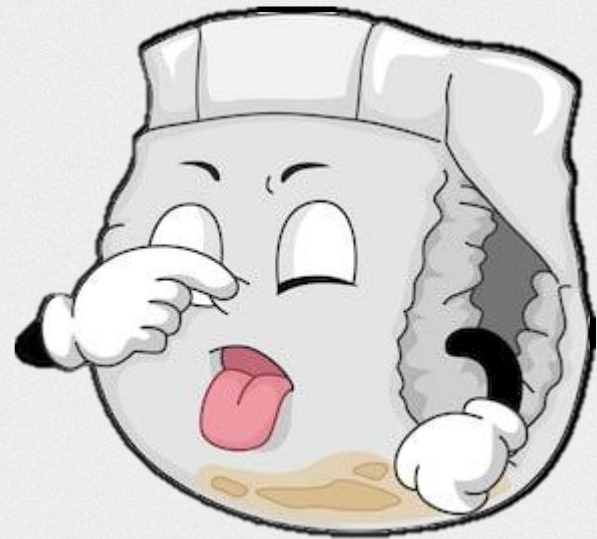


# What is New Sewage?

- “flushable” wipes
  - Baby wipes
  - Cleansing wipes
  - Disinfecting wipes
  - Throw away mop heads
  - Rags
  - Diapers



**❑ NON-SPHERICAL SOLIDS**






# Result of “Flushable” Wipes









# Talk on Social Media

**Beaumont Police**  
March 26 at 9:43 PM


**REMINDER! DO NOT FLUSH "FLUSHABLE WIPES".**  
We are getting a large number of sewer stoppages because of disposable wipes.



Please do not flush items such as baby wipes, paper towels, rags, clothing, or other items not intended to be flushed. Flushing of these items will cause blockages in your sewer line and possibly the city's main lines, resulting in sewer backups. This also applies to the so-called "flushable wipes" which do not break down and commonly cause blockages. Any of these items, if used, must be placed in a garbage bag and placed inside your garbage can for collection.

See pictures of problems "flushable wipes" can cause.



232129 Comments883 Shares

**Adam Stewart** shared a post.  
March 27 at 10:28 PM




**Putnam Public Service District**  
March 26 at 12:57 PM

Like Page

Yesterday, both pumps in our lift-station located on Pine Drive in Poca, West Virginia failed due to an overload of wet-wipes and what appeared to be heavy paper products like paper towels. We are asking all of our customers, please, be mindful that wet-wipes say they are flushable but they do not break down easily or quickly and cause our sewage pumps to clog up and fail thus triggering a raw sewage spill.

The pictures show how the wipes & paper products clog up the sewer system.

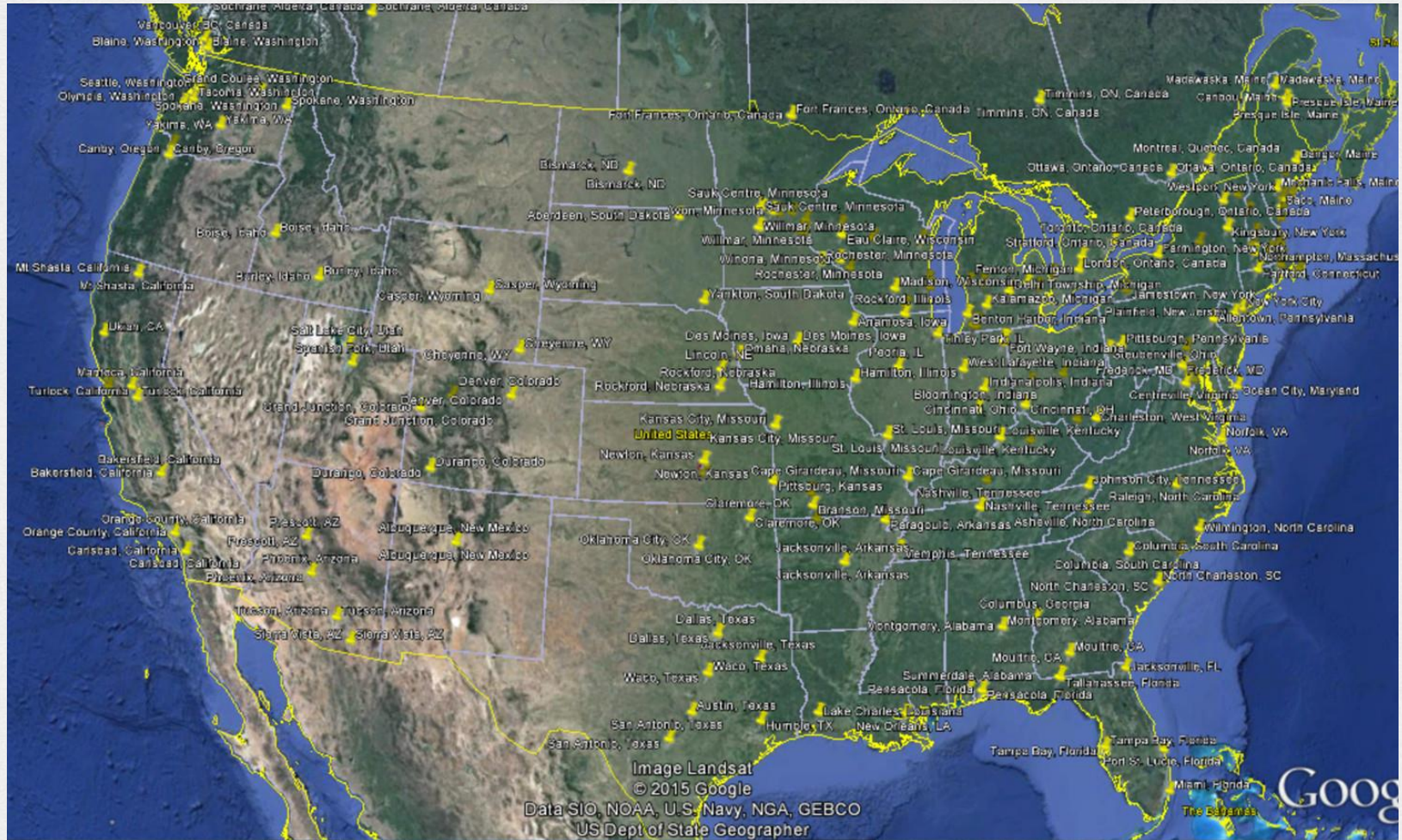
You and 31 others10 Comments

 **Angry**

Comment



# Cities with Significant Wipes Outreach Program – 2015

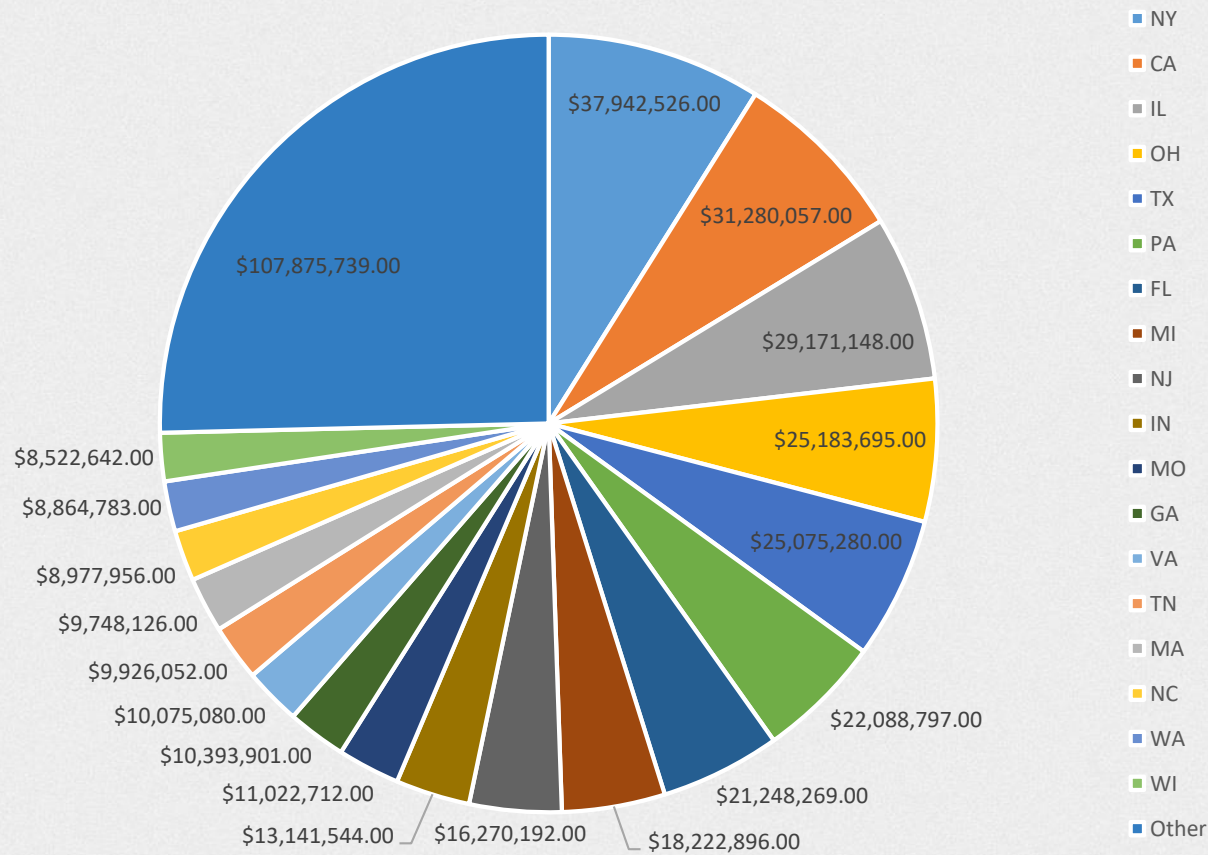


Source: Maine Water Environment Association (2015)



# Annual Cost of Wipes in the U.S.

**\$425,031,394**



Source: National Association of Clean Water Agencies,  
(December, 2019)

# COSTS - How Big is the Problem?

## **Collection System**

- Cleaning and unclogging
- SSO backup remediation from clogs

## **Lift Stations**

- Cleaning bar screens of accumulated wipes
- Upgrading screens/etc. to accommodate wipes
- Pump maintenance from clogs due at least in part to wipes
- Pump/grinder pump replacement after failure due to clogs
- Acquisition of new grinder pumps to accommodate wipes
- Extra electricity costs due to wipe-clogged pumps
- Extra disposal costs due to wipes

## **Headworks**

- Extra maintenance of bar screens due to wipes
- Upgrading screens/etc. to accommodate wipes
- Extra disposal costs due to wipes
- Extra electricity costs

## **Treatment Works**

- Maintenance of clogged primary clarifier equipment due to wipes
- Maintenance of clogged primary sludge pumps due to wipes
- Maintenance of mechanical mixers in secondary treatment chambers due to wipes
- Maintenance of clogged SWAS pumps/equipment in aeration tanks
- Extra vactoring in secondary settling tanks due to wipes clogs
- Maintenance/replacement of activated (RAS) sludge pumps due to wipes
- Maintenance of chlorine contact tanks due to wipes
- Maintenance of sludge thickening equipment/grinder pumps due to wipes clogs
- Maintenance/replacement of sludge dewatering pumps and cetrifuges due to wipes overloading/clogs

## **CSOs**

- CSO remediation from clogs
- Fines and penalties for excess CSO events

## **General SG&A Costs**

- Public education on proper wipe use and disposal

## **Environmental**

- SSO and CSO overflows cased by wipes clogging conveyance networks or causing pumps to fail

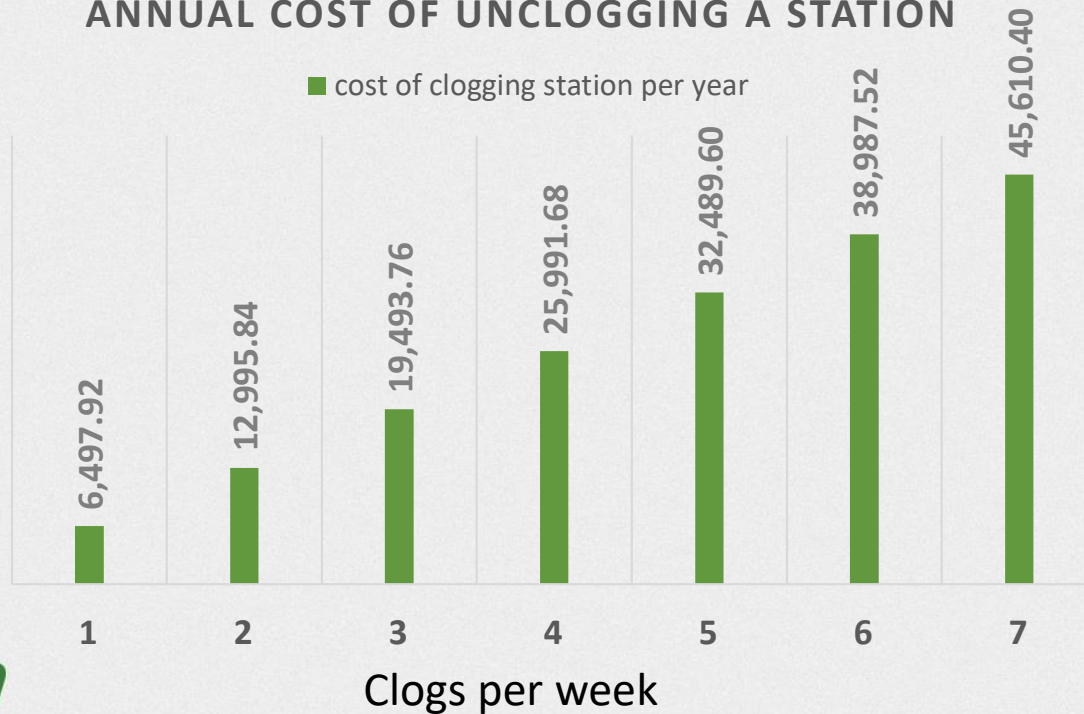
Source: National Association of Clean Water Agencies,  
(December, 2019)



# Cost of a Clogging Pump in a Pump Station

- Two waste water personnel needed
- \$31.24/hr per worker (Washington State Average Salary Earnings <https://esd.wa.gov/labormarketinfo/occupations>)
- Average Two hours to unclog pump

ANNUAL COST OF UNCLOGGING A STATION



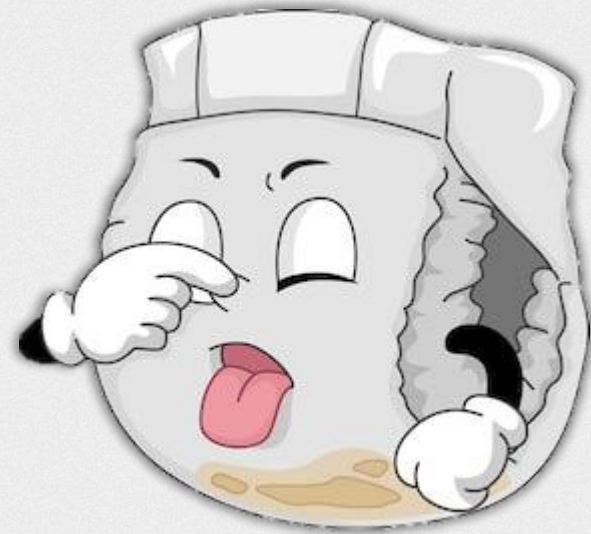
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## ❑ NON-SPHERICAL SOLIDS

- Floatables & Grease





# What is New Sewage



- Floatables - Fats, Oils and Grease
- Wipes Combine with grease
- Tough on Collection Systems

# Result of Grease in Collection Systems

- Poor Station operation – clogging and costly maintenance
- Blockages
- Sewer capacity reduction
- odor





# Costs of cleaning a lift station

- Vac Truck

- New \$250,000-\$450,000
- \$255-295/hr for vac truck services

- Bypass unit

- New \$40,000-\$115,000
- \$451/day (6" model)

- Sewer Pumper Truck

- Approximately \$60,000 for used unit
- \$210-215

## Other possible costs

- Surge tanks
- Contractor fees to connect piping and set up equipment for station clean out
- Overtime pay for cleanouts done at night for low flows

# Cost For A Typical City (~3 MGD)

- 15 Pump Stations
- Cleaned every two weeks (2 hours each time)
- 390 cleaning events = 780 hours
- Material Costs
  - Vac Truck Rental (\$250/Hour)
  - Boom Truck
  - Pressure Wash/Cleaning Equipment
- Hourly rate
  - \$82/hour mechanical + \$96/hour electrical
- **Winning Bid = \$179,740.00 / YEAR**



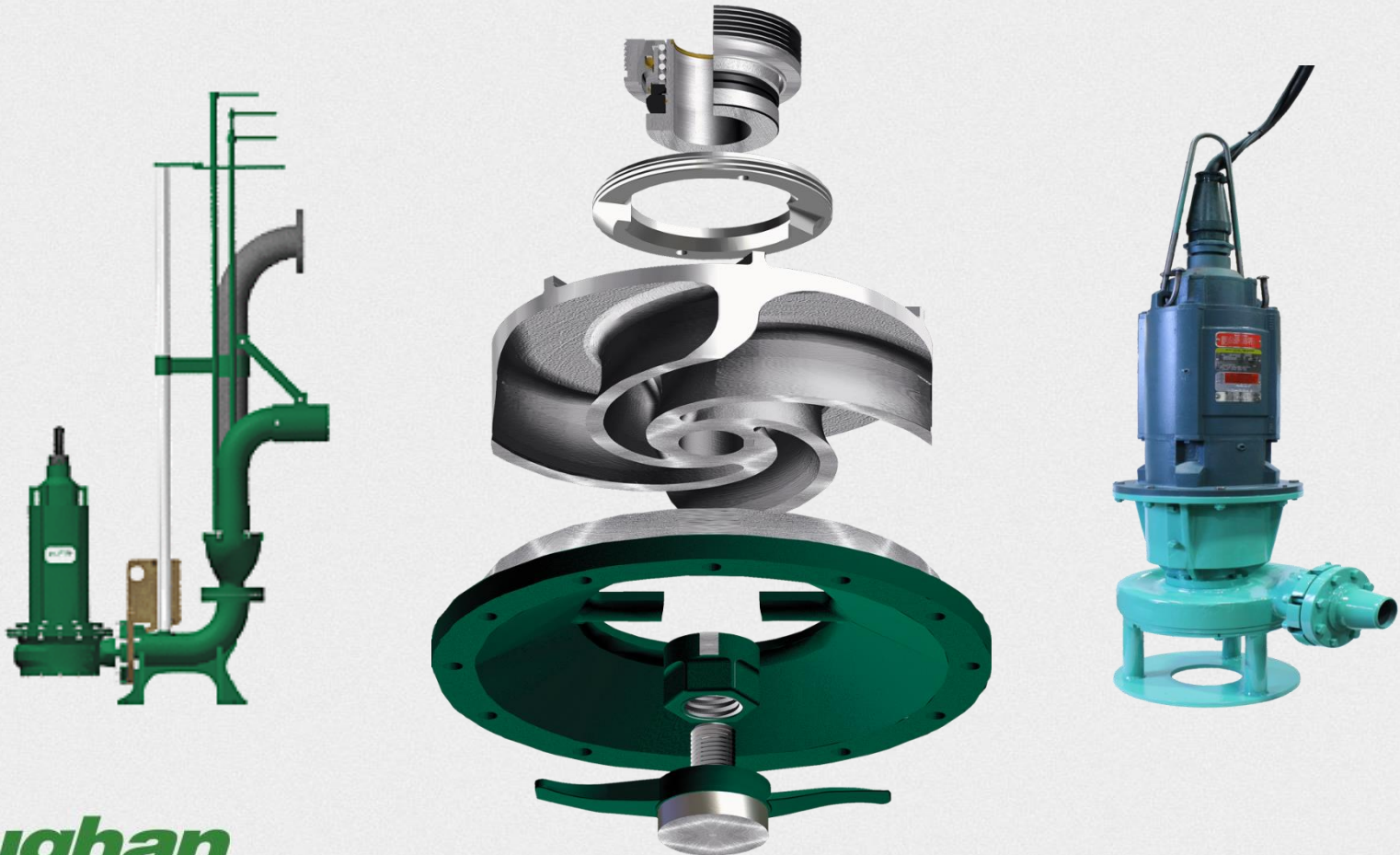
# What is the cost of Health & Safety?

- There is no cost too steep
- Goal is to minimize unnecessary exposure





# Innovative and Reliable Solutions to New Sewage

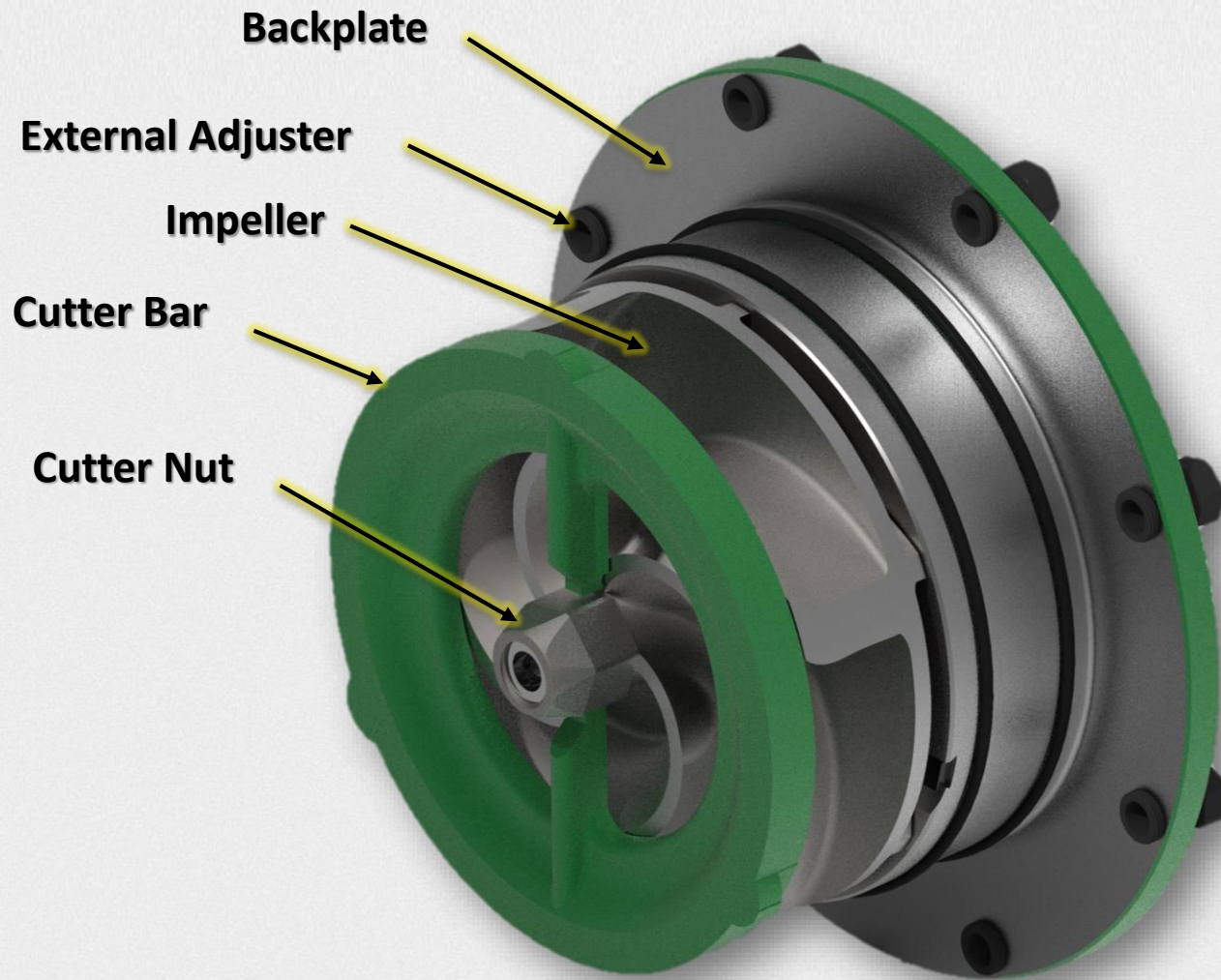




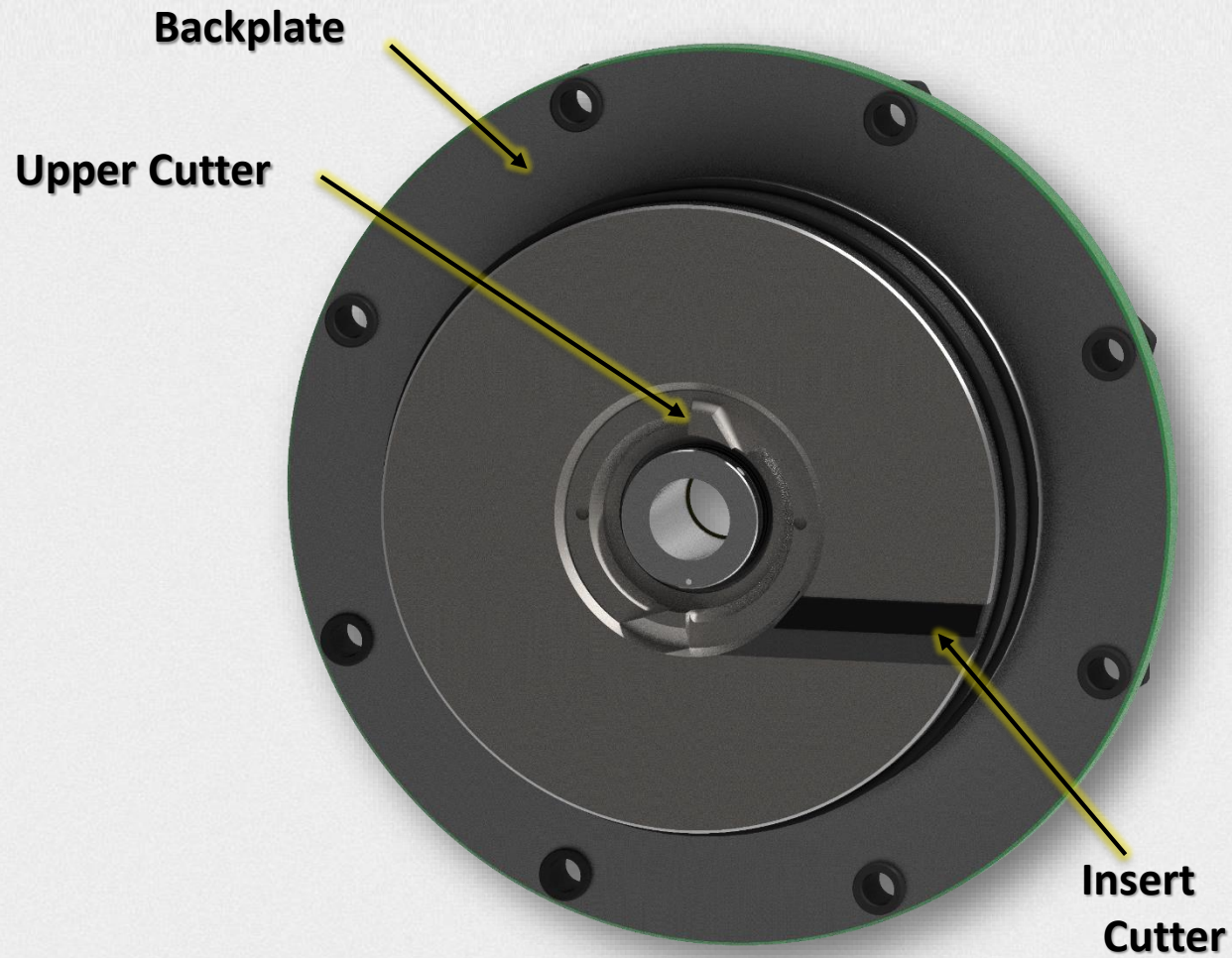
# Vaughan Chopper – Solution to Wipes

- Vaughan Flushless Mechanical Seal
- Upper Cutter
- Impeller
- Cutter Bar
- Cutter Nut
- Disintegrator tool (optional, usually for industrial applications)

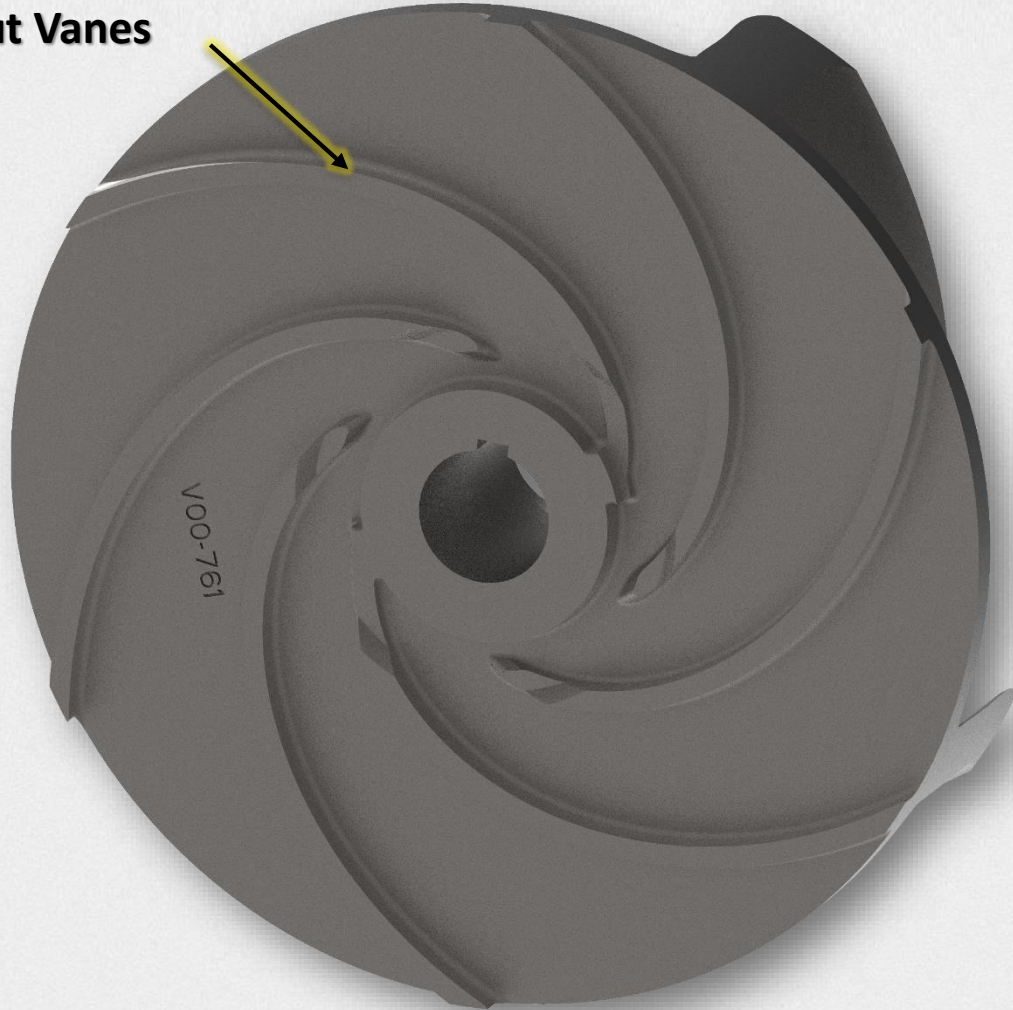






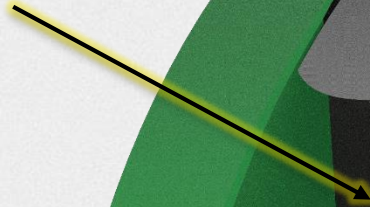


**Pump-out Vanes**





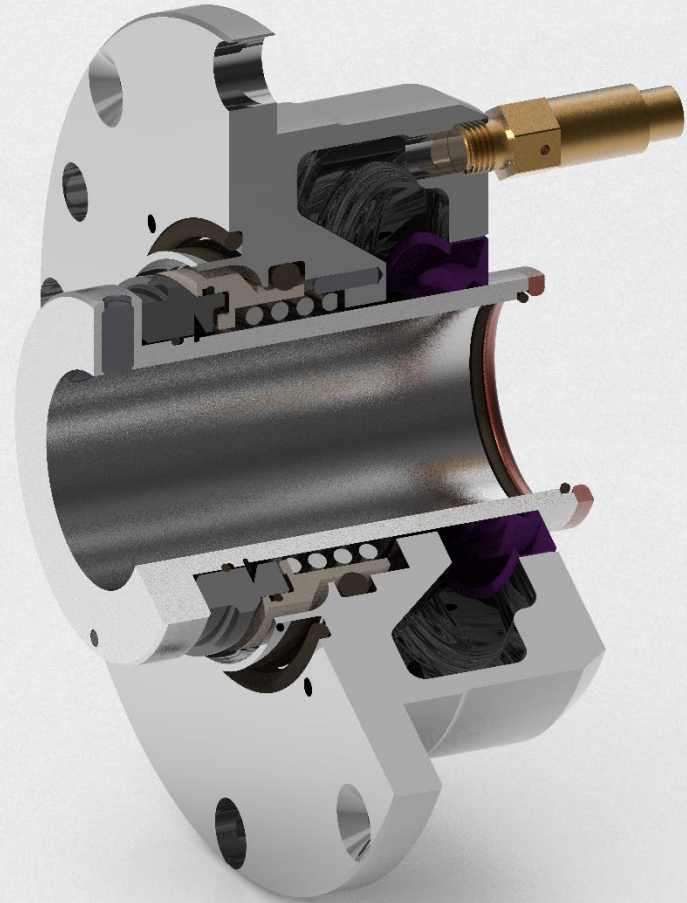
**Insert Cutter**



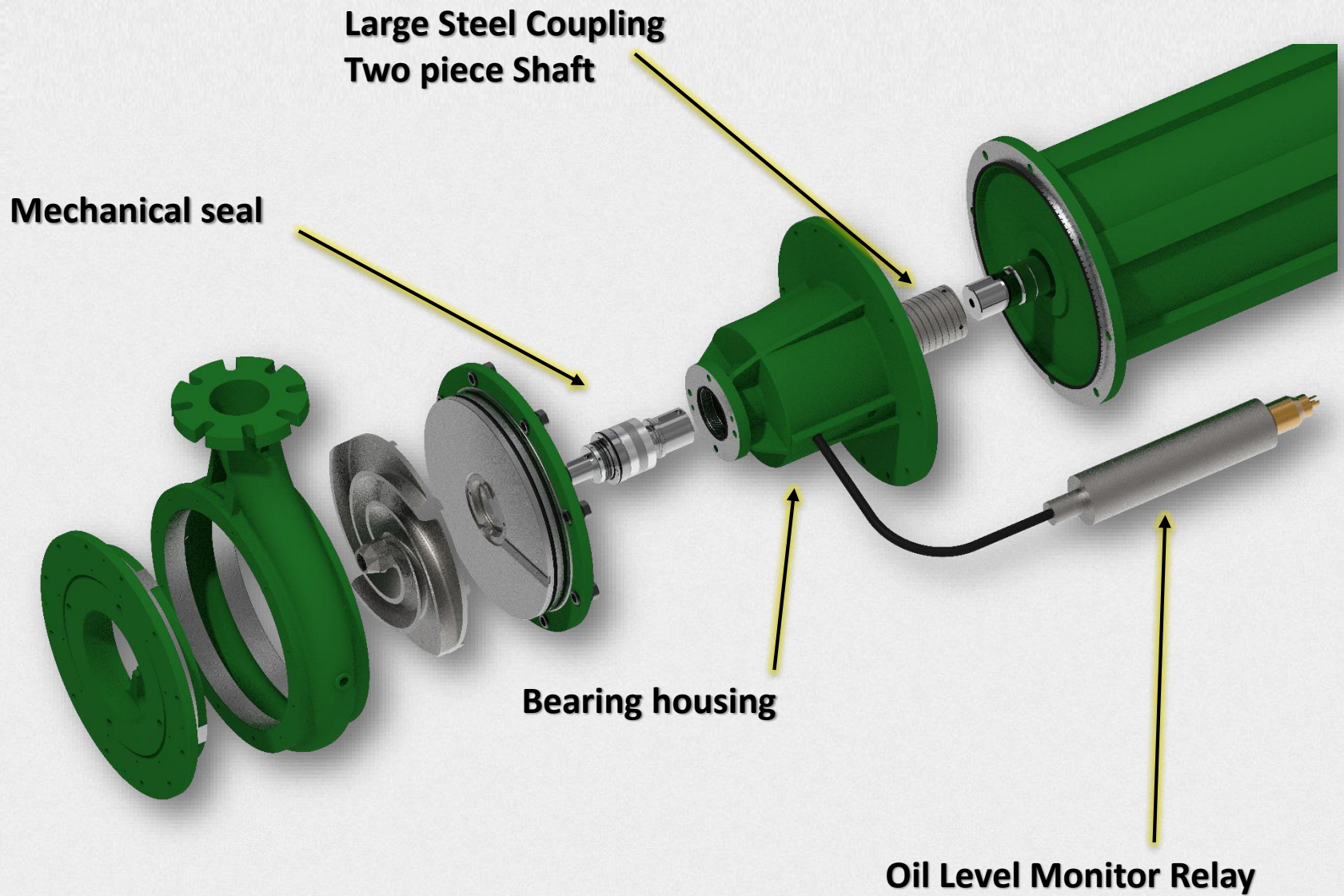
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# Vaughan Flushless Mechanical Seal

- Cartridge type
- Oil filled
- Silicon Carbide or Tungsten Carbide seal faces
- Eliminates stuffing box and cavities behind the impeller
- Easily maintained
- Easy to install









# Aberdeen Influent Station

## Problem –

- Old influent station pumps clogging once per day.
- Approximately \$37,000 per year to unclog pumps

## Solution –

- Vaughan PE8N
- Cost \$29,060

## Result –

- Less than 1 year payback





# Retrofits and adaptability

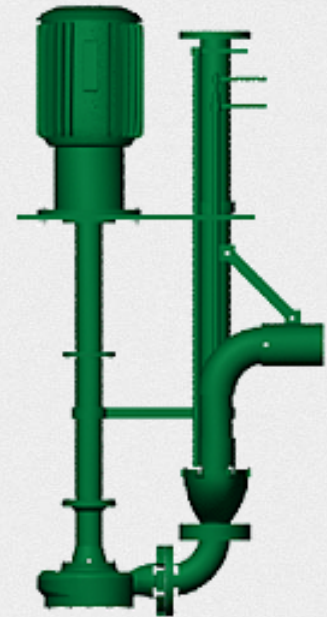
- Custom pedestal design for drop-in replacement
- Use existing guide rail system
- Replace Grinder & non-Clog combination
- Meets horsepower of existing pumps

Existing piping

Custom Base



# Solutions to Floatables & Settling Solids





# Vertical Recirculators and Submersible Recirculators

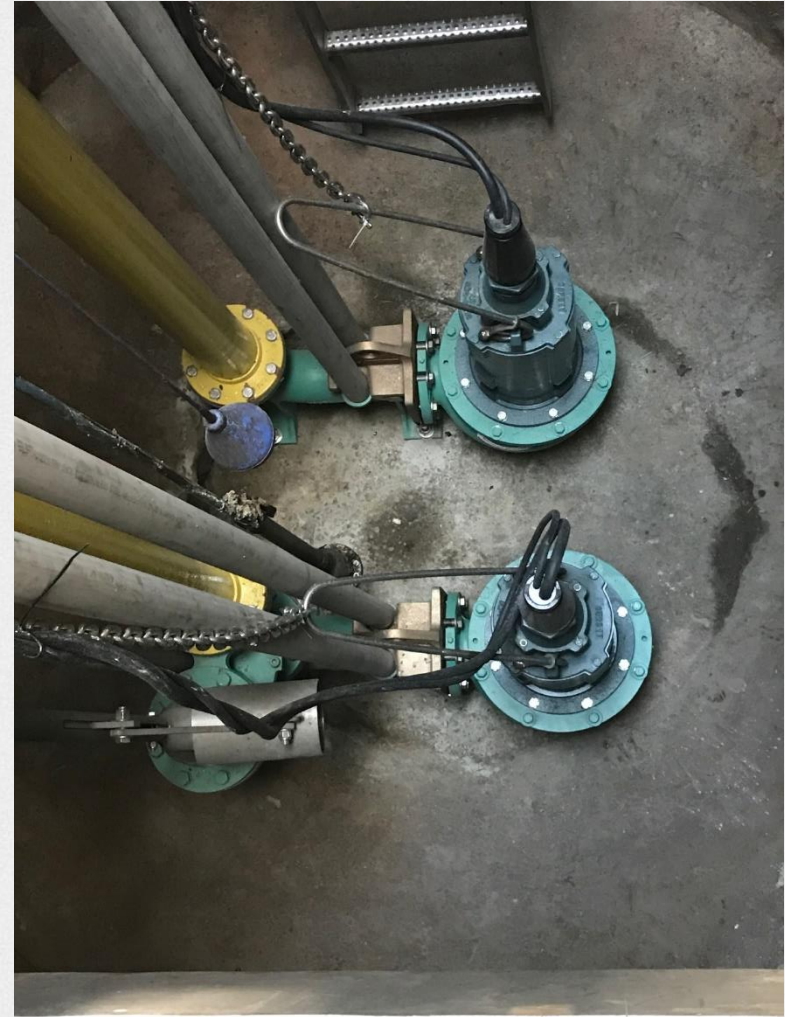


- Vaughan “Pit cleaning” devices
- Resuspends
- Homogenize
- Pump Out
- One piece of engineered equipment with multiple functions

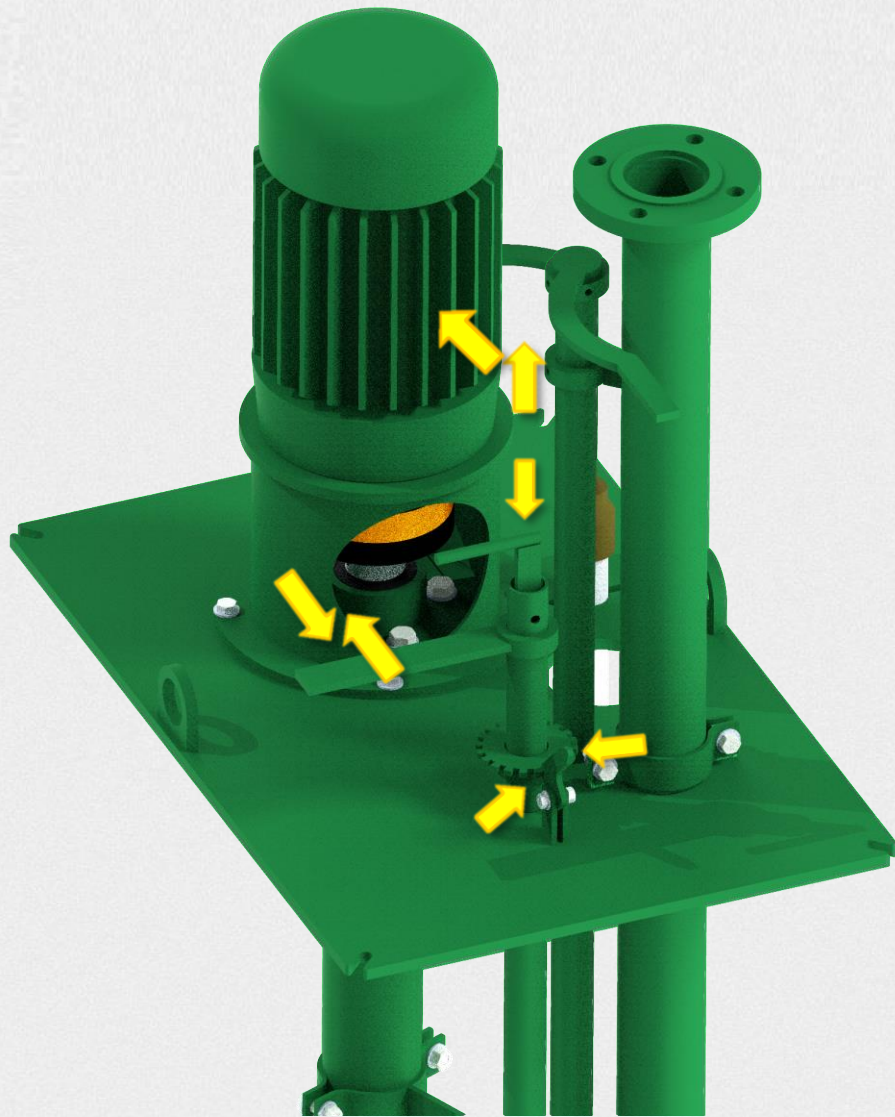


# Vertical Recirculators and Submersible Recirculators

- Nozzle is adjustable a minimum of 180 degrees horizontally and 45 degrees vertically
- Auto Valve-actuator feature
- Duplex systems with one Recirculating device

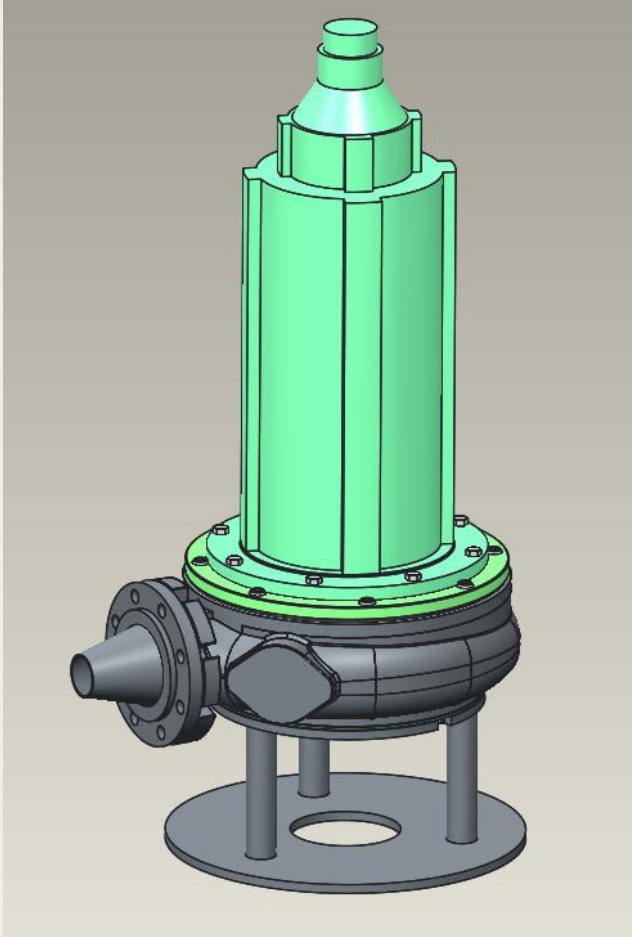








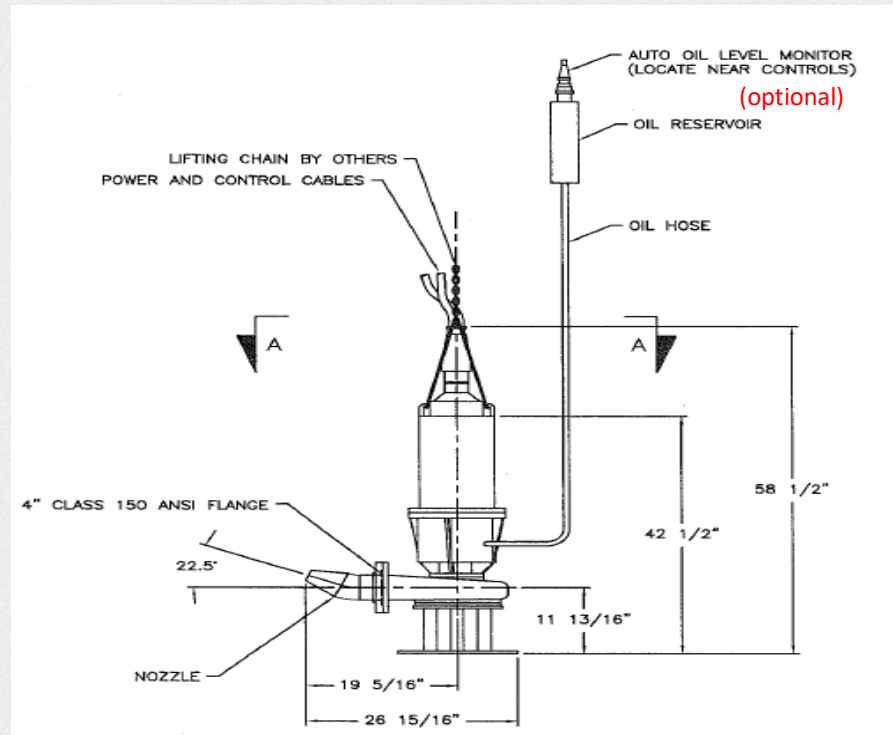
# VAUGHAN CONDITIONING PUMP





# Conditioning Pump Features

- HIGH VELOCITY STEEL MIXING NOZZLE
- MULTIPLE NOZZLE AIMING CONFIGURATIONS FOR EACH CUSTOMERS SPECIFIC APPLICATION
- DIFFERENT NOZZLE MATERIALS AVAILABLE
- OVERSIZED BASES
- ENGINEERED SOLUTION



# CONDITIONING PUMP APPLICATIONS

- PROTECTION OF NON-CLOG PUMPS
- HOMOGENIZES SOLIDS/FLOATABLES/GRIT
- ELIMINATES THE USE OF VAC TRUCKS
- CONSTANT STREAM OF SOLIDS TO WWTP SCREENS





# CONDITIONING PUMP ACCESSORIES

- CONTROL PANELS AVAILABLE
  - FLOATS AND/OR TIMERS
  - MOISTURE/THERMAL RELAY
  - OIL MONITOR RELAY



# Make Your Conditioning Pump Mobile

- Multiple panels, multiple stations, one conditioning pump
  - Quick disconnect for power cables
- Can be used with mobile Generator





# CONDITIONING PUMP APPLICATIONS

- DEBRIS MAT
- OLIVENHAIN, CA



# CONDITIONING PUMP APPLICATIONS

- DEBRIS MAT DISIPATED DUE TO CONDITIONING PUMP
- OLIVENHAIN, CA





# CONDITIONING PUMP APPLICATIONS

## GRIT ELIMINATION



# Otay River PS Cost Savings

- Problem – Floating layer of grease and settling solids – 4 foot thick floating layer at times
  - \$50,000-\$100,000 per year in station cleaning including vac truck costs
  - Duty Pumps too expensive and too new to replace
- Solution – Vaughan Conditioning Pump 8 inch 25 hp 1200 RPM -
- Result – No clogs and no vac trucks since install in 5+ years of service, payback in under 3

months

**Vaughan**

Unmatched Reliability



# Vaughan Chopper Superior Reliability

-Robust-

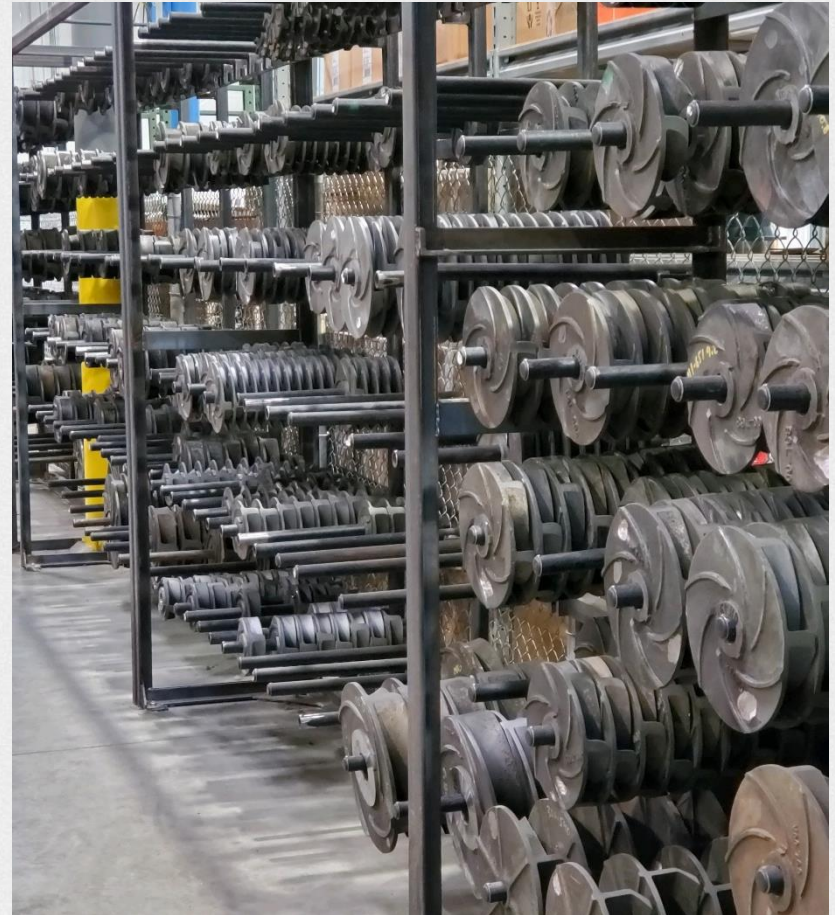
- Hardened cast steel parts to Rockwell 60C
- Externally adjustable
- 100,000 hours of bearing life
- Vaughan Mechanical Seal
- Oil level monitor system



# Vaughan Chopper Superior Reliability

-Reliable-

- \$5-7 million of spare parts in inventory
- Expedite options available
- Try and Buy program
- Install lists available
- Made in the USA





# Vaughan Reliability – Morgan's Point, TX Hurricane Harvey

- Problem pumps from 2009-20016 cause approximately \$100,000 in maintenance and service
- Existing problematic non-clog pumps replaced in 2016
- 2017 Hurricane Harvey hits Houston
- 100 inches of rainfall, 72 straight hours, 2.5 million gallons of unscreened sewage
- Zero Clogs

# Lessons Learned

- New Sewage is attacking our collection systems and waste water treatment plants
- Current non-clog pumps have difficulty pumping and handling new sewage that is non-spherical solid
- Maintenance to unclog a pump is costly
- Grinder and Non-clog – two wearable pieces of equipment
- Vac trucks are expensive to rent and purchase
- Cost for health and safety



# Lessons Learned



- Vaughan has the Solution!
  - Industry leading chopper pump to handle wipes
  - Recirculation “pit cleaning” feature
  - Single piece of equipment for multiple jobs
  - Consistent metering of material to the plant helps with even loading at the plant
  - Adaptability and Retrofits to existing installations
  - Reliability is key for a healthy and safe work environment

# Lessons Learned

## Cost Savings and Reliability with Vaughan

- Cost savings for clogging – Aberdeen, WA \$36,500+ per year
- Cost savings for floatables and settling solids – Otay River PS, CA \$50,000-\$100,000 per year in station cleaning costs
- Unmatched Reliability – Morgan's Point, TX- Ran through Hurricane Harvey without a single clog



# Contact The Vaughan Team For more Information



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Tennessee-

The Eshelman Company Inc.,

&

Appalachian Environmental  
& Equipment

Contact Vaughan for  
specifics