

# Maintenance Basics

## Course one

### “Is Efficient Operation of WWTPs Possible?”

OHIO EPA –

COMPLIANCE ASSISTANCE UNIT

“12% of all power generated in the USA is consumed by water and wastewater treatment plants.”

New information suggests that the correct figure is closer to 4%





Pounds of pollutants received at the WWTP;

$$0.051 \text{ mgd} * 8.34 * 200 \text{ mg/l cbod5} =$$

$$85.1 \# \text{ per day} * 1.1 \# \text{ O2} = \quad \quad \quad 94 \# \text{ O2 demand}$$

$$0.051 \text{ mgd} * 8.34 * 42 \text{ mg/l nh3n} =$$

$$17.9 \# \text{ per day} * 4.6 \# \text{ O2} = \quad \quad \quad \underline{82.3 \# \text{ O2 demand}}$$

Total Demand 176.3#

Total Demand **176.3#**

The electric cost averages \$42.03 per day

\$0.24 per pound

Supplying  $633,600 \text{ CFD} * 0.0173 \# \text{O}_2 / \text{CF} =$  **10,961#O<sub>2</sub>**

Only 1.6% of the oxygen is being used.

Most of the rest is wasted!!!



**1/2" holes = 182 sq ft**

**2 mm holes = 1829 sq ft**

**10 times the surface area!**

**Same Mixing when solids are less than 3%**





Dan Kopec



**DANGER**  
AUTHORIZED  
PERSONNEL  
ONLY

Vic



Dan Gill



**Carbonaceous consumed before nitrogenous**

**Follow the ammonia !**

Change diffusers – Lower MLSS – Track Ammonia

Centrifuge to quantify bug volume

Follow the ammonia !



# Follow the ammonia !

Once ammonia is stable at lower MLSS,

Start turning off the blower.

1 or 2 hour blocks daytime

Longer blocks at night



MULT BY

REG K PI RATIO PROG ID

20.57  
MAX W



GE Electronic Meter

Reg Type M-90AE



General Electric Company Springfield N H USA

TYPE EV-5 FM15S

CL200  
240V  
4W  
△

R.O.C. CAT.NO. 716X15  
66086



\*UAD09373 68366086\*

93 731 683

9937214-1

AEP  
6513856

To reduce demand

**Add a VFD !**

**Program it as a Soft-Start**



# To be more versatile, Add a PLC or SCADA



**[WWW.gridsmartohio.com](http://WWW.gridsmartohio.com)**

Let them pay some !

They paid half of the \$8325.50 experiment.

**Fill out the paperwork first !**

**Thanks Dan!**



21% less bill than 2009 average

**41% Projected**

**55% ?**

**Why?**

**Inability to waste sludge**

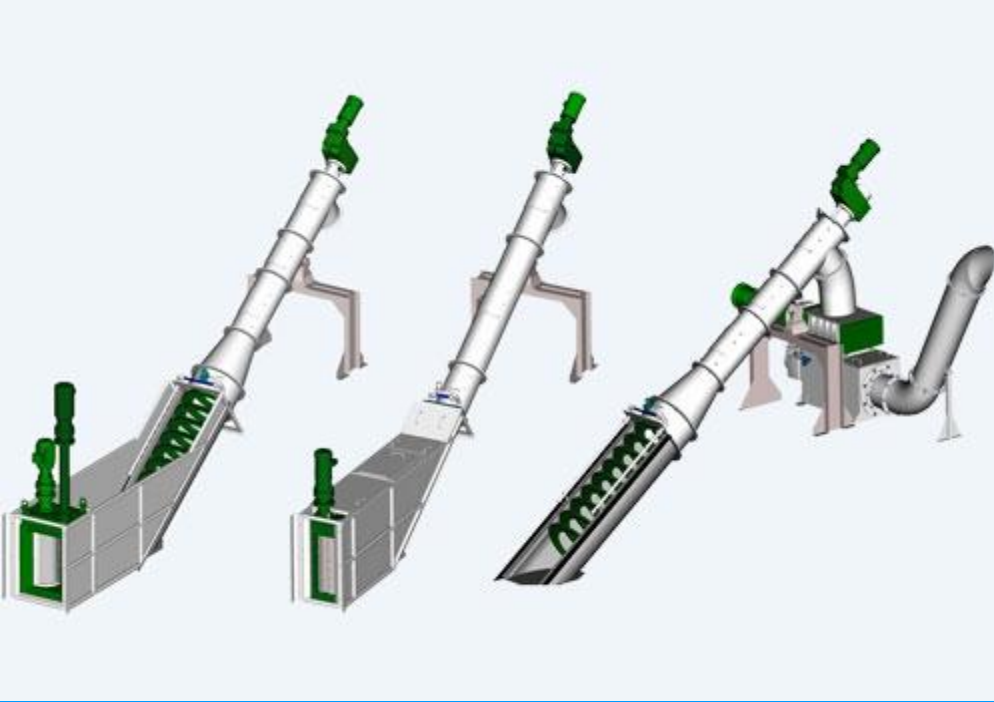
**Mechanical Failures**



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**Grounding ring**

**39% savings over the 2009 average**

**41% Projected**

**55% Targeted**

**“Wastewater treatment is easy. Dealing with people is the hard part.”**

**\$42.03 per day \* 30 days = \$1261 per month \* 39% = \$492 per month savings.**

**Project cost \$4163 / \$492 per month = 8.5 months payback**

- Diffuser efficiency-

Replace if low or old

- Waste until the ammonia goes up

Track with fish kit and centrifuge

- Turn off blower

1~2 hours during the day, longer at night

- VFD or SCADA to be more versatile

**8.5 months payback to save 39%**

If the plant is running a BIO-P process-----

Shutting off air doesn't work because the bugs dump phosphorus

Use VFD to drop blower speed to match air volume to what is needed by the bugs

Anoxic first tank is needed

- **Further experimentation.....**

- **Treat between 9PM and 7 AM**

  - Take advantage of reduced rates at night

  - Use the EQ tank for day storage

  - I&I may be a problem during rains



Don't forget about the EQ tank blower!

It's purpose is to poison anaerobes and to provide mixing.

Turn it off with timers.

If odors are an issue, add more time on.

- **Further experimentation.....**

- **Take half the plant off-line**

Apply for plant re-rating to 125,000 GPD

**\$8000 per tap times new excess capacity= additional**  
**\$888,000 collateral**

**Just for running the plant efficiently**

- **Further experimentation.....**

Use ORP and PLC to control blowers



Side Benefits.....

Works for any size plant

The Perfect F/M ratio

Reduce Growth of Filaments

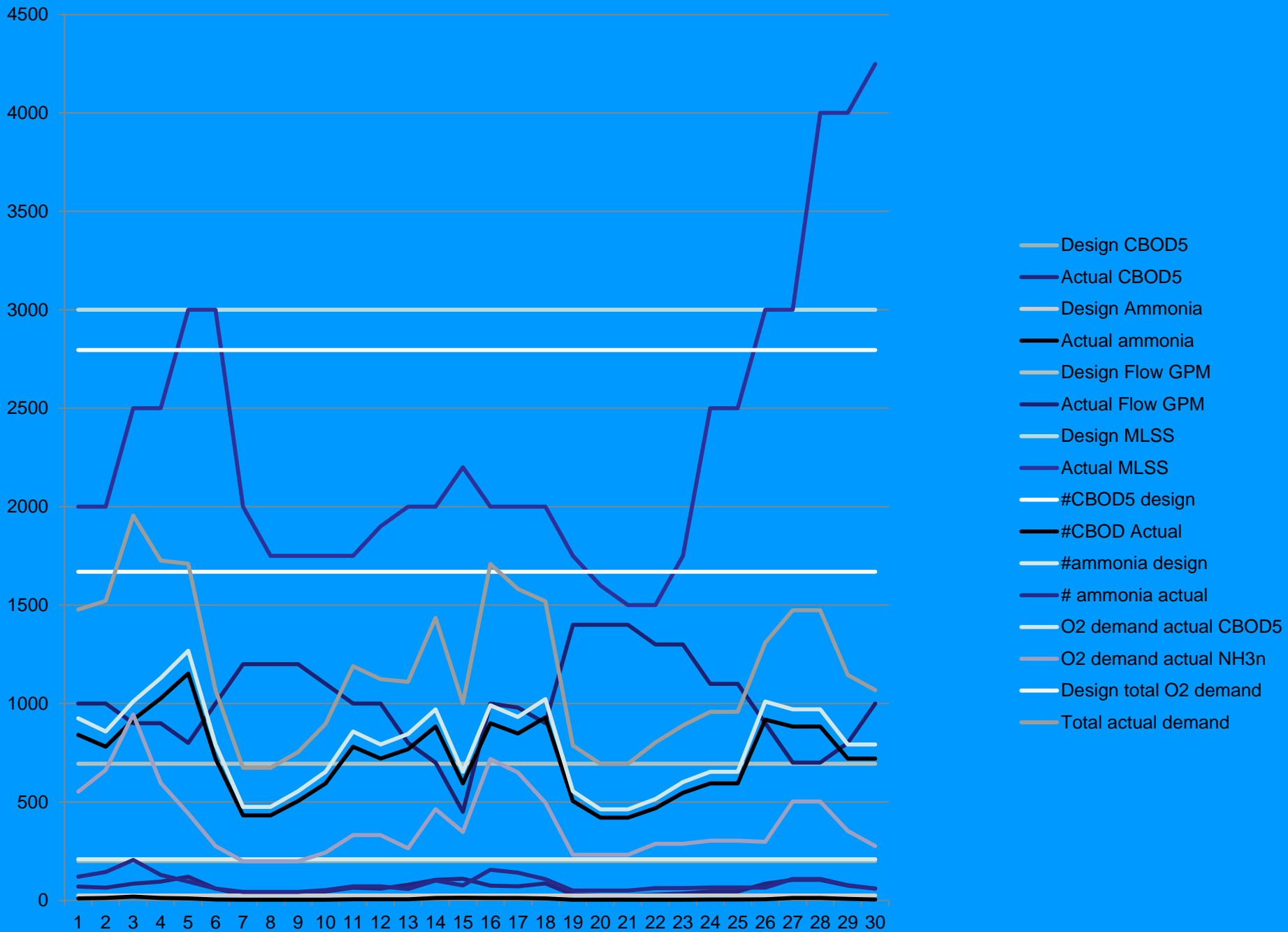
**Denitrification**

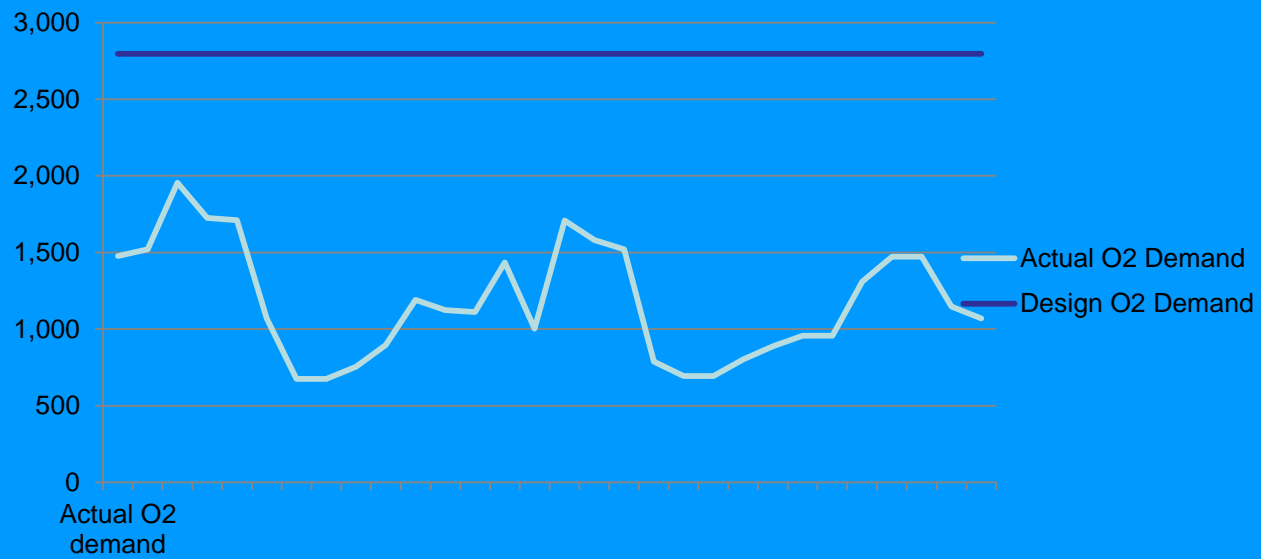
Questions?



## Design vs Real-life

- 200 mg/l CBOD5
- 25 mg/l Ammonia
- MGD vs GPM











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# AMMONIA

$\text{NH}_3/\text{NH}_4^+$   
TEST KIT

FRESH WATER / SALT WATER  
EAU DOUCE / EAU DE MER

Monitor ammonia  
to help prevent  
fish loss

Surveillez  
le taux  
d'ammoniaque  
pour éviter la perte  
de poissons



