

The Ohio Package Plant Initiative

**Solving Significant Noncompliance
through Effective Process Control**

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The Universe of Small Discharge Non-compliance

NPDES Permitted WWTPs < 100,000 gpd
SNC at some time over 2 year period

Central	153	37	24%
Private	44	12	
Public	41	11	
Semi-Public	16	3	
Specific	52	11	
Northeast	732	151	21%
Private	109	33	
Public	99	23	
Semi-Public	439	77	
Specific	85	18	
Northwest	389	78	20%
Private	72	19	
Public	105	20	
Semi-Public	178	34	
Specific	34	5	
Southeast	210	52	25%
Private	37	9	
Public	92	24	
Semi-Public	38	11	
Specific	43	8	
Southwest	233	28	12%
Private	75	14	
Public	41	5	
Semi-Public	14	9	
Specific	103	0	
Grand Total	1717	346	20%

Welcome to my world.





Welcome to my world.



Welcome to my world.

A photograph showing a polluted waterway. In the foreground, there is a concrete curb with a greenish patina. Several pipes and conduits run vertically along the curb. One pipe has a white cap with a red ring. The ground is dark, muddy, and covered with brown and yellow leaves and other debris. The water in the background is dark and turbulent, with some floating trash. The text "Welcome to my world" is overlaid in white on the right side of the image.

Welcome to my world

Stop the bleeding . . .

Common reasons for Noncompliance:

1) The operator doesn't understand principles of wastewater treatment

we can train the operator

2) The design is deficient

we can figure out work arounds

3) The administration doesn't support the operator's needs

this is what enforcement is for...?

Stop the bleeding . . .

Common attitudes of operators/owners:

"I don't give a _____!" "well, maybe enforcement"

"It costs too much!" "compliance is cheaper"

"We've tried everything!" "grasping at straws"

It is possible to work with these attitudes.

Stop the bleeding . . .

Big Picture

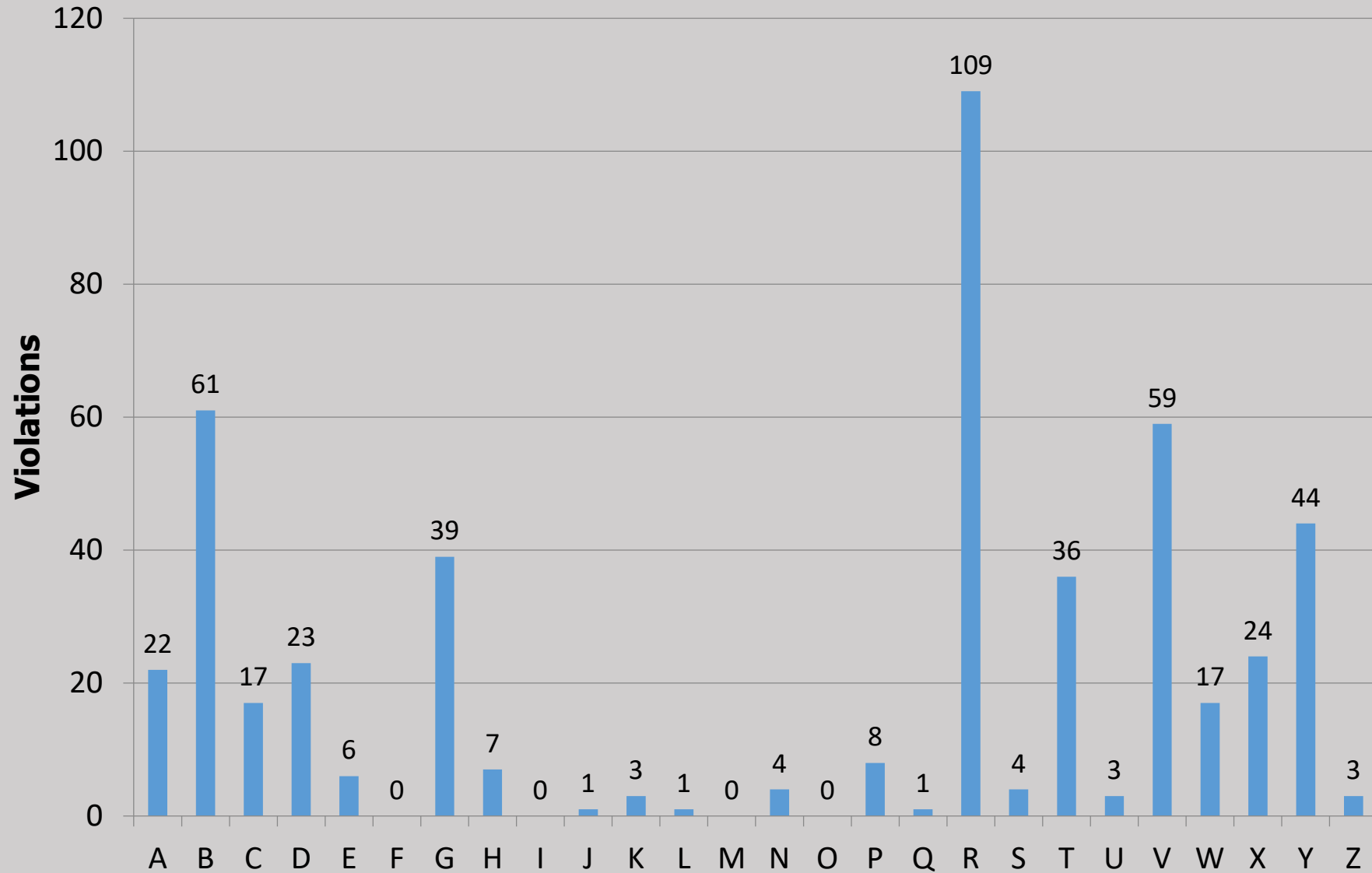
Review of SNC data

What are the problems?

Where are the problems?

What is the most effective solution?

Type Facility SNC April - October

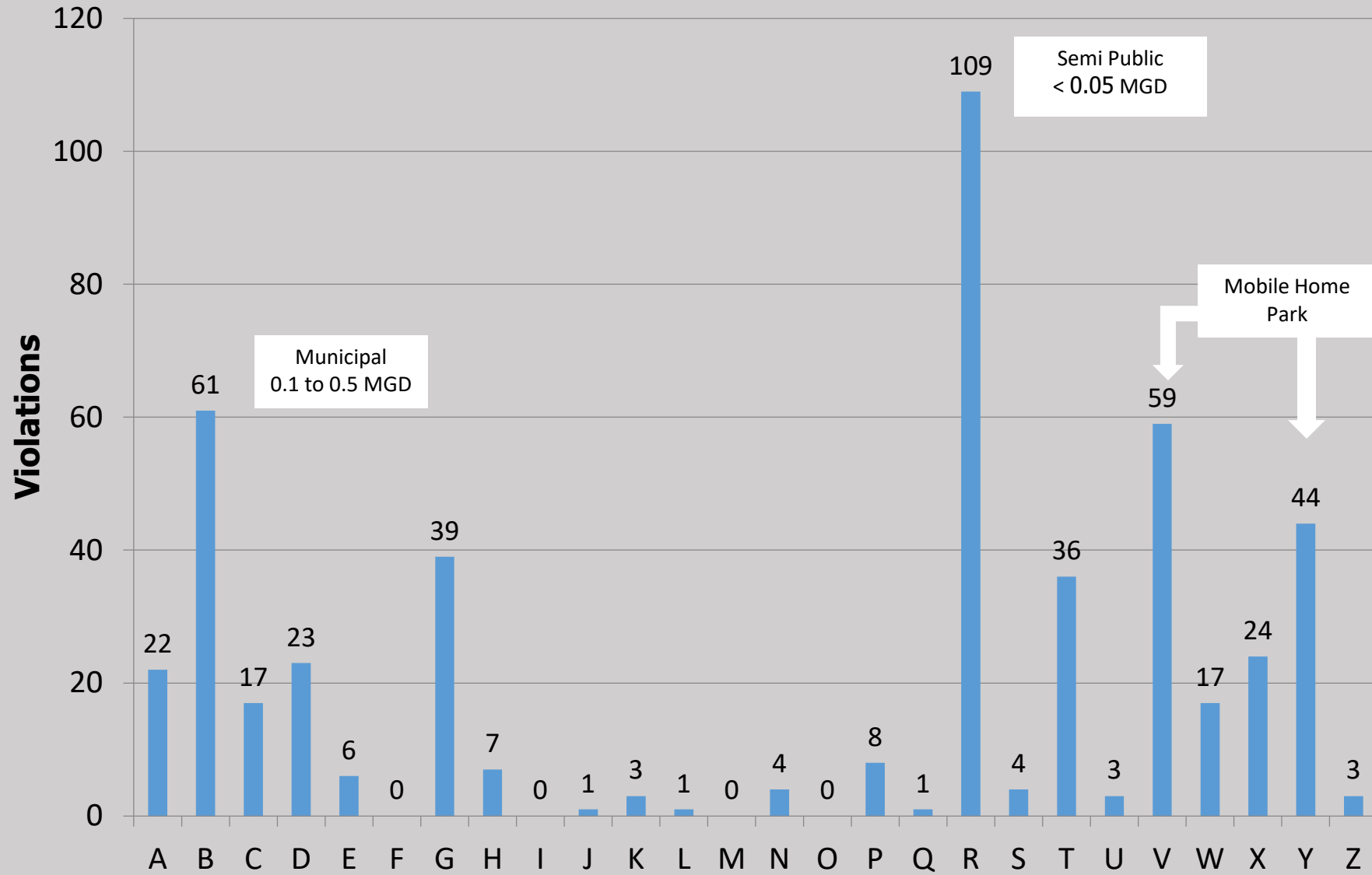


Ohio NPDES Permit 1 P B 0 0 0 0 5 * A D

Letter	Public
A	Municipality – Under 0.1 MGD
B	Municipality – 0.1 to 0.5 MGD
C	Municipality – 0.5 to 1.0 MGD
D	Municipality – 1.0 to 10 MGD
E	Municipality – 10 to 50 MGD
F	Municipality – Greater than 50 MGD
G	County/Sewer District – Under 0.1 MGD
H	County/Sewer District – 0.1 to 0.5 MGD
I	Storm Water
J	County/Sewer District – 0.5 to 1.0 MGD
K	County/Sewer District – 1.0 to 10 MGD
L	County/Sewer District – 10 to 50 MGD

M	County/Sewer District – 50 MGD or more
N	Federal Facility
O	-
P	State Facility
Q	Regional Authority
R	Semi-Public – less than 0.05 MGD
S	Semi-Public – Greater than 0.05 MGD
T	Schools and Hospitals
U	PUCO
V	Mobile Home Parks
W	Subdivisions and Apartment Complexes
X	Miscellaneous
Y	Mobil Home Parks
Z	Extension of R's

Type Facility SNC April - October



Stop the bleeding . . .

Type "R" Semi Public < 0.05 MGD

Who are they?

4-H / FFA camps

Marinas

Small Manufacturing

Bars/Taverns

Restaurants

Schools

Motels

Churches

Their #1 business is not the #1 business.

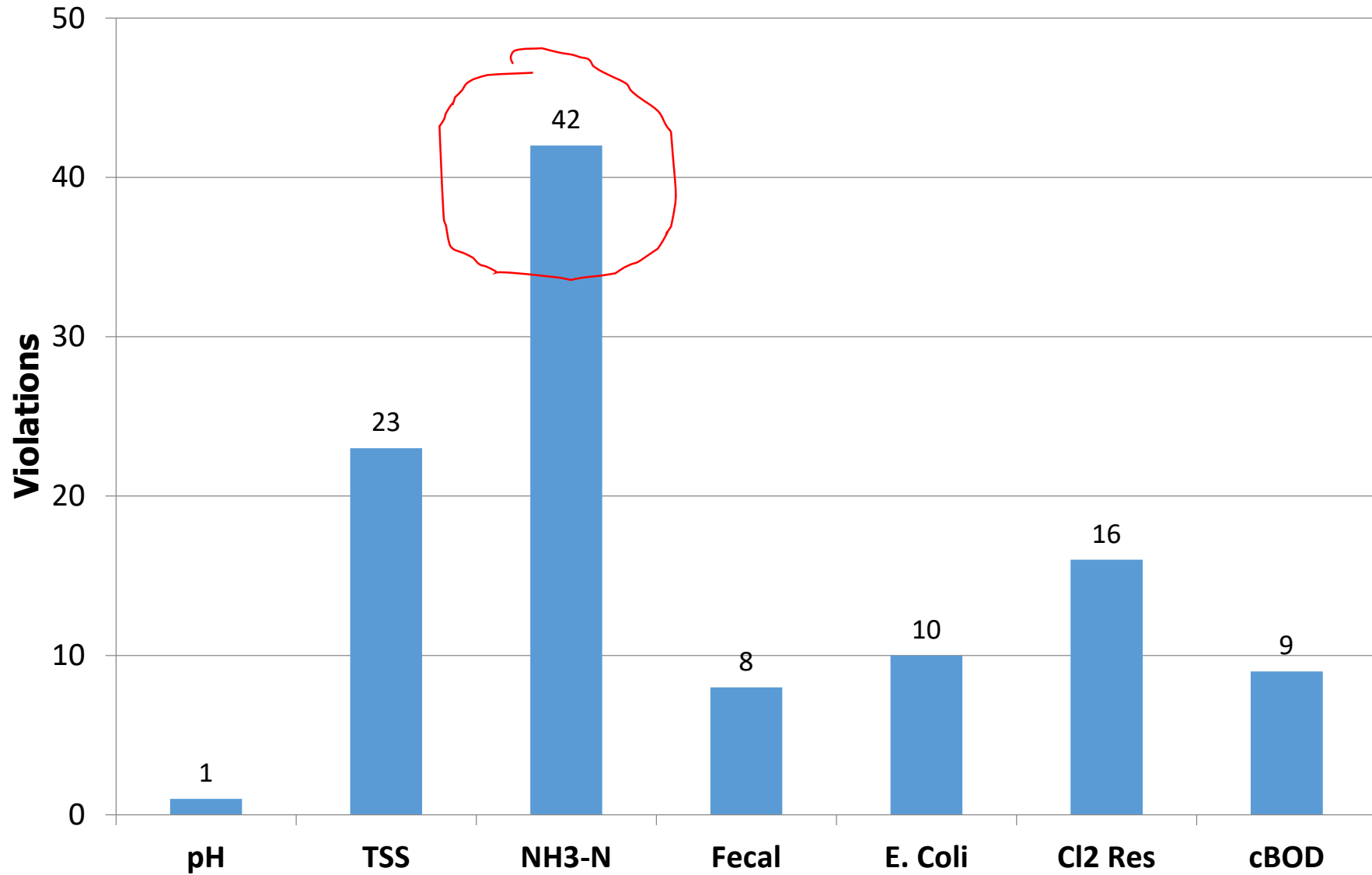
Might require more "hand holding".

Stop the bleeding . . .

Type "R" Semi Public < 0.05 MGD

What are their issues?

Semi Public < 0.05 MGD (violations by parameter)

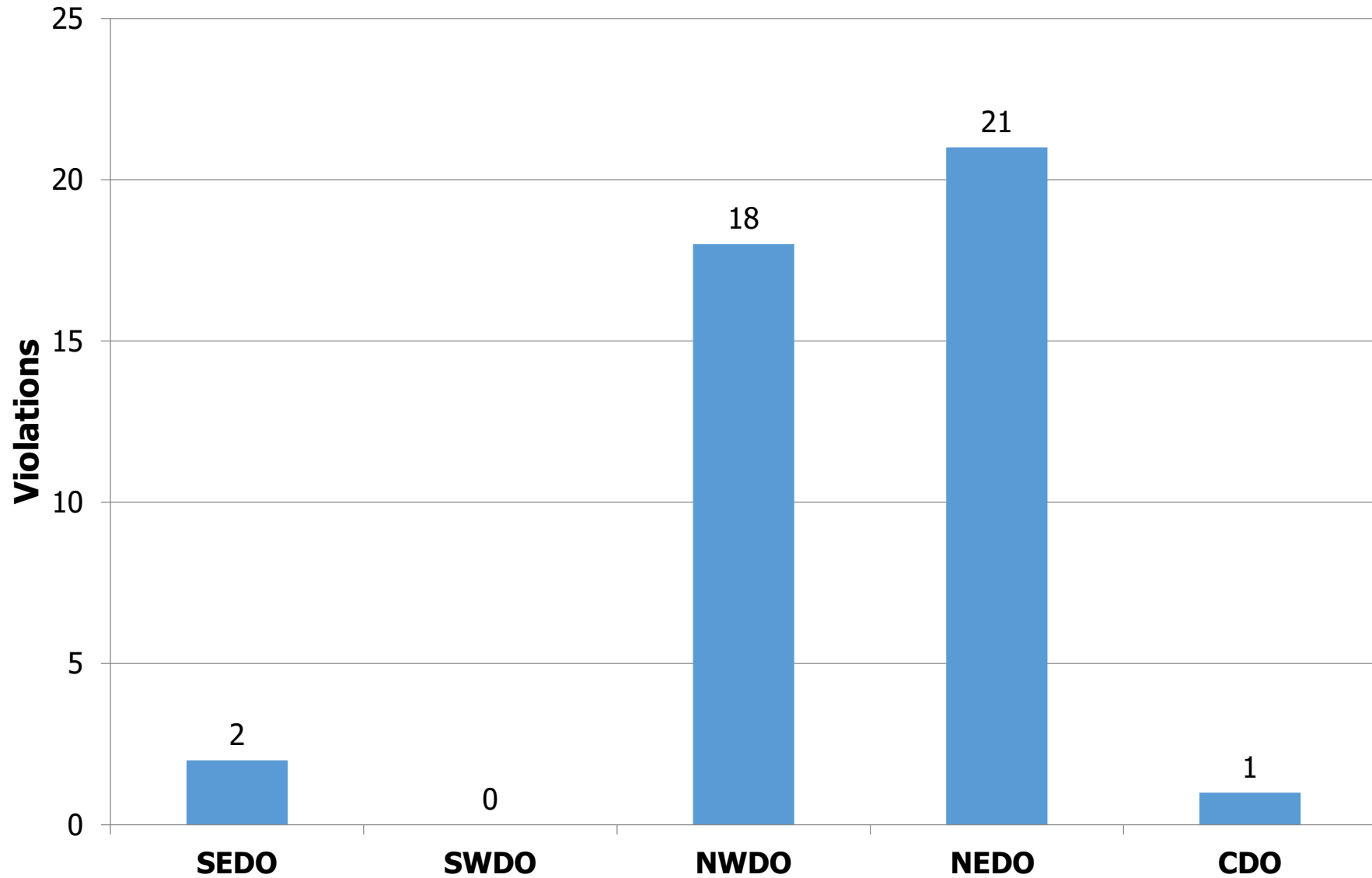


Stop the bleeding . . .

Type "R" Semi Public < 0.05 MGD

Where are they?

**Semi Public < 0.05 MGD
NH3-N violations by district**



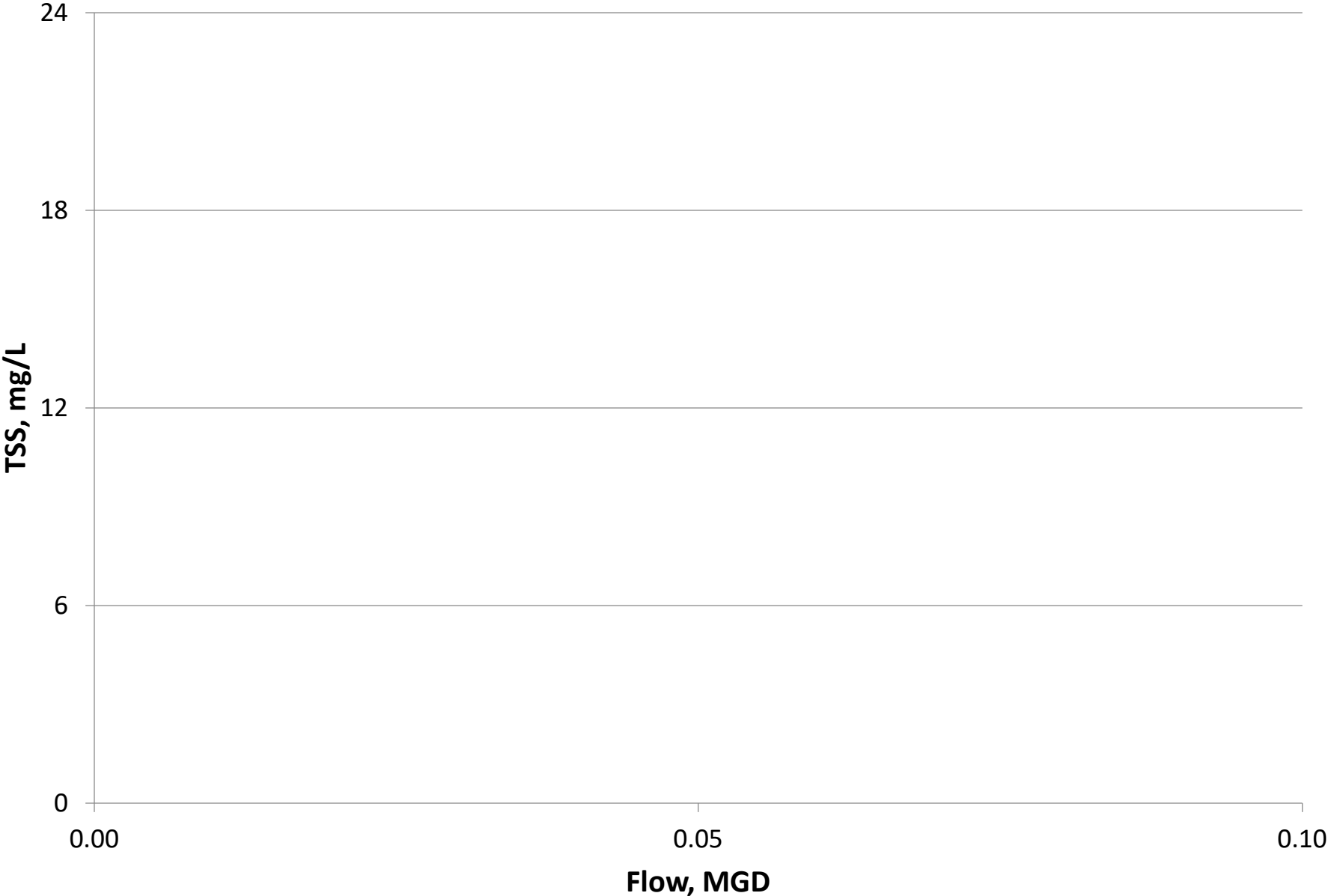
Stop the bleeding . . .

Type "R" Semi Public < 0.05 MGD

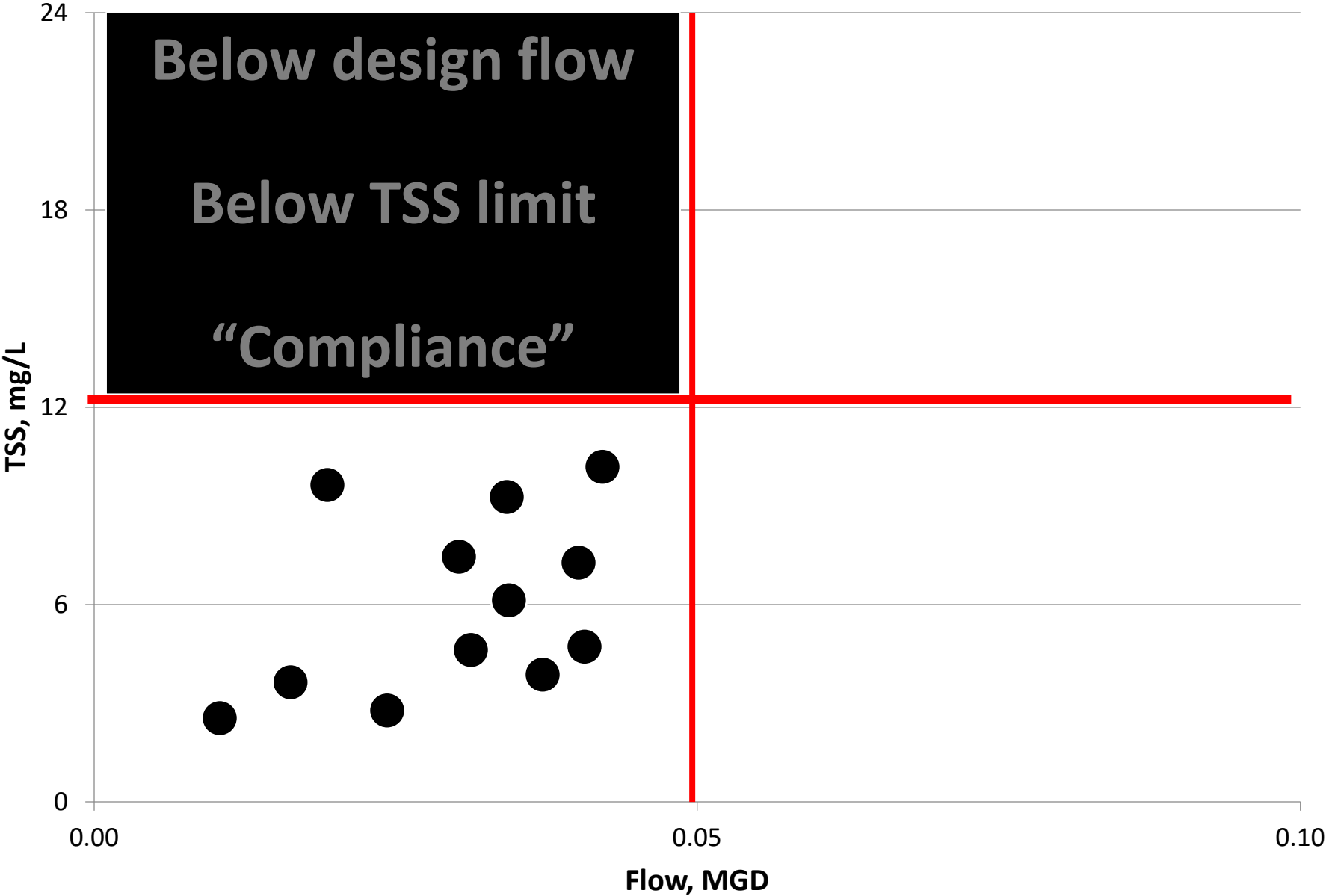
Effective use of resources:

1. Develop training for semi public
2. Focus on nitrification, TSS, chlorine / *E. coli* / fecal coliform
3. Focus training on NEDO / NWDO
 - Perform training with classroom instruction
 - Repeat on-site
 - Repeat again and ask operators to bring in data

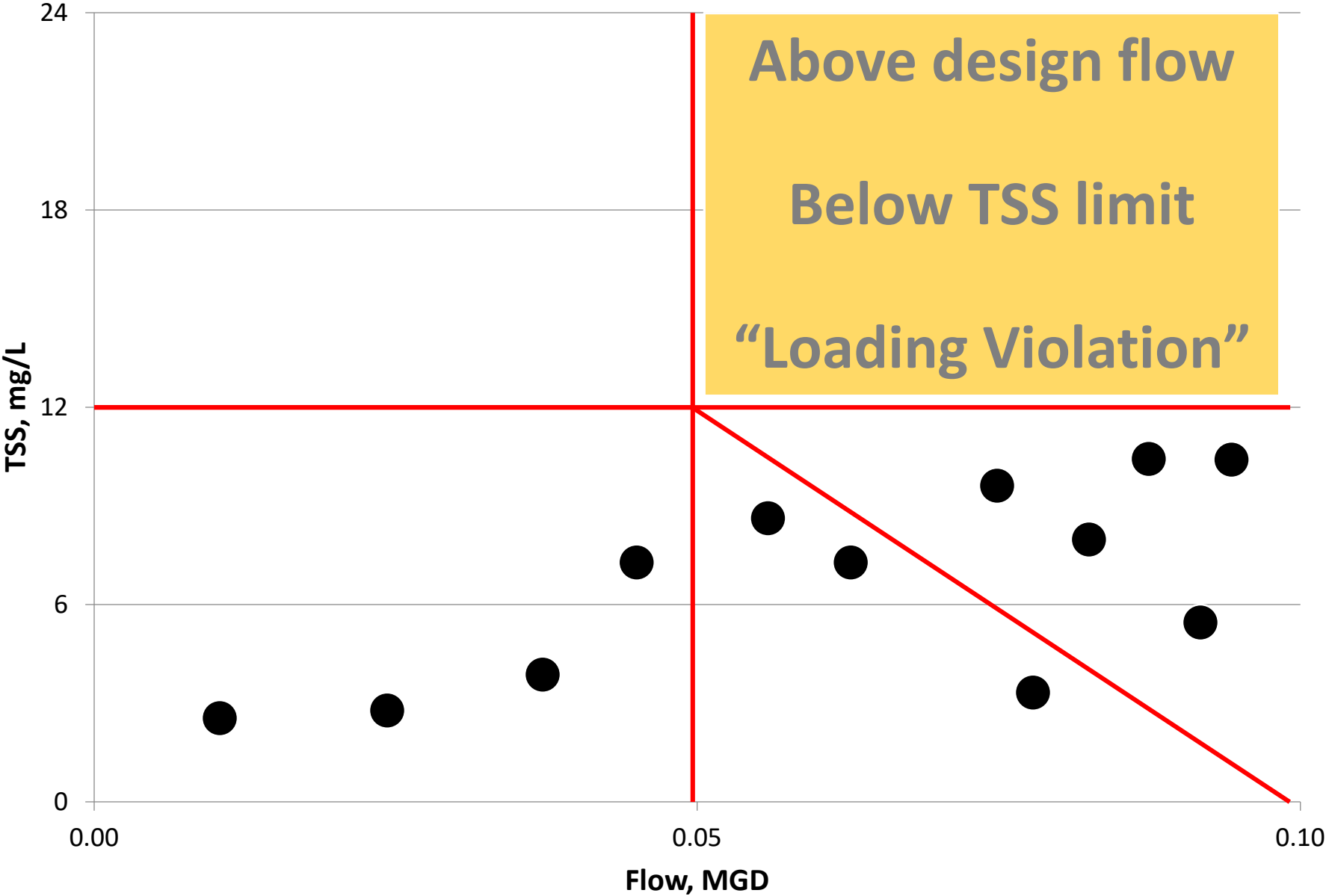
Flow vs TSS



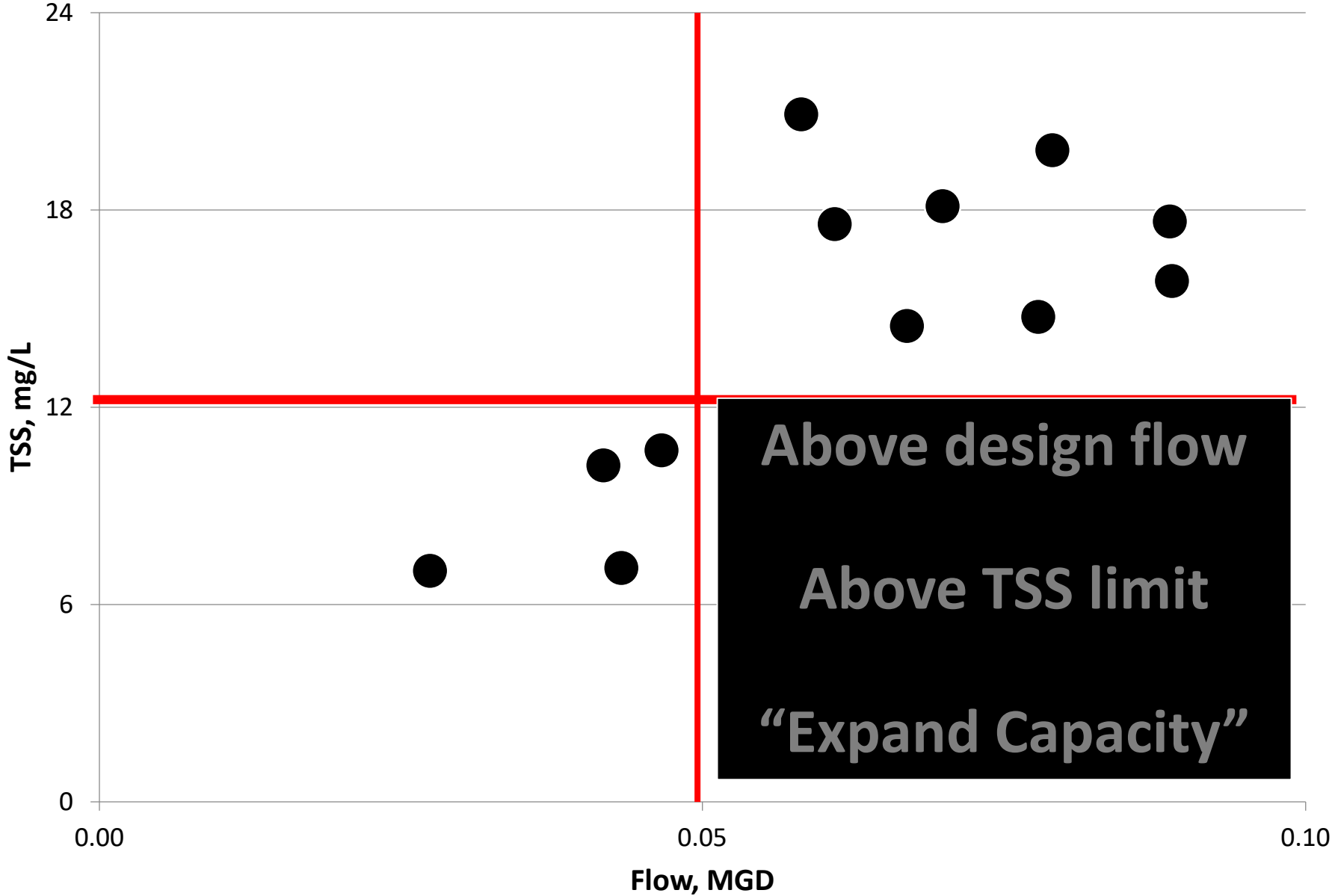
Flow vs TSS



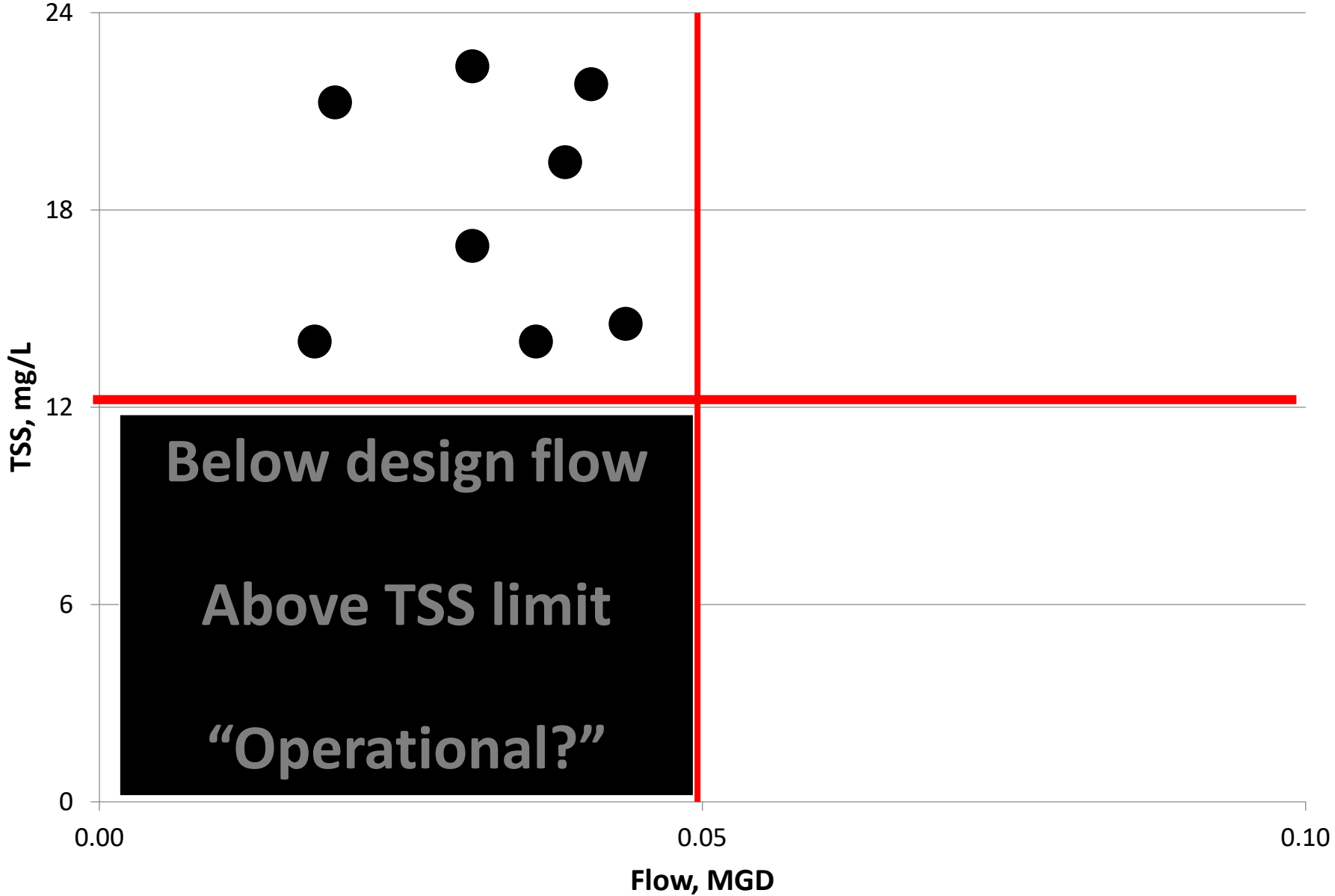
Flow vs TSS



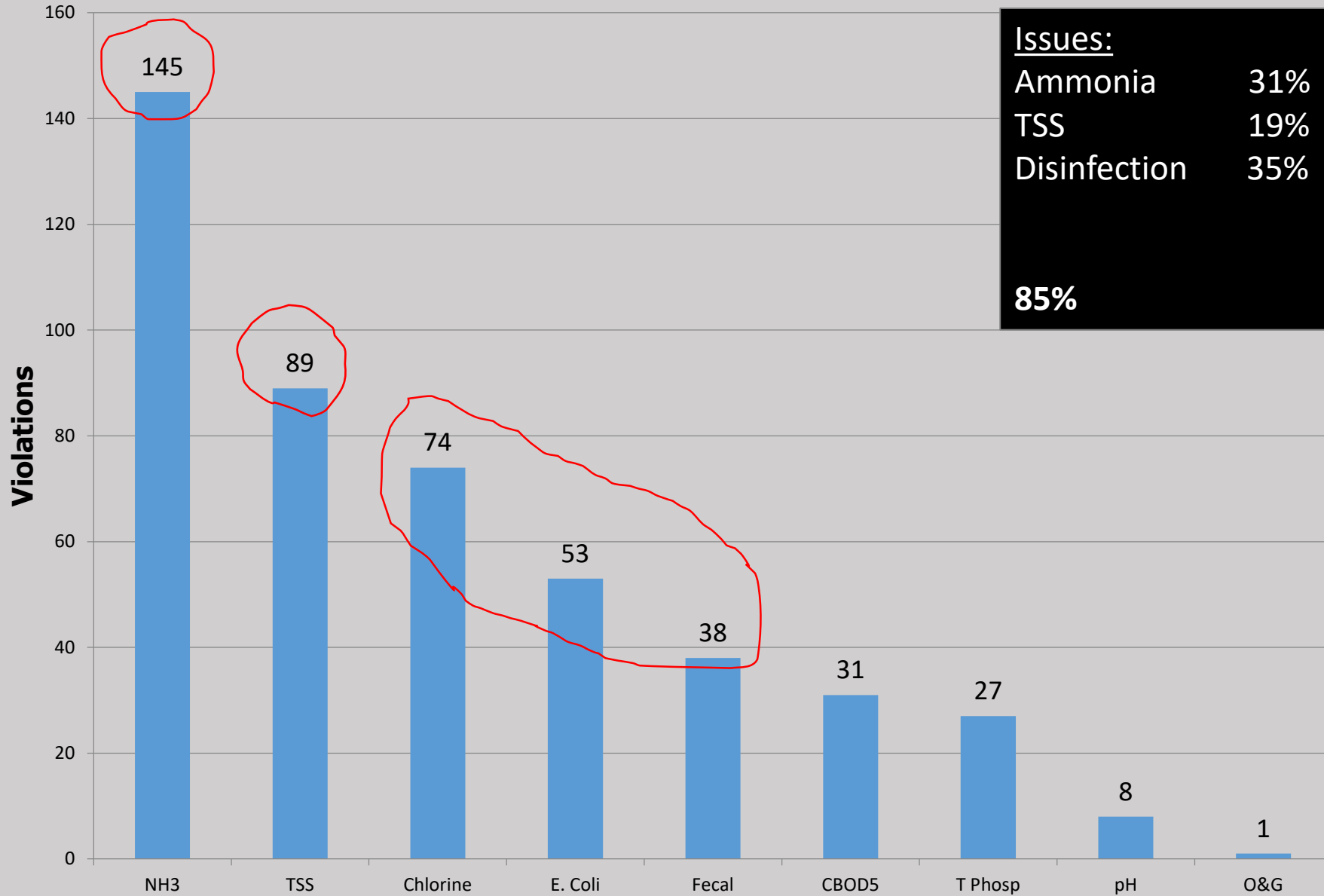
Flow vs TSS



Flow vs TSS



SNC April - October

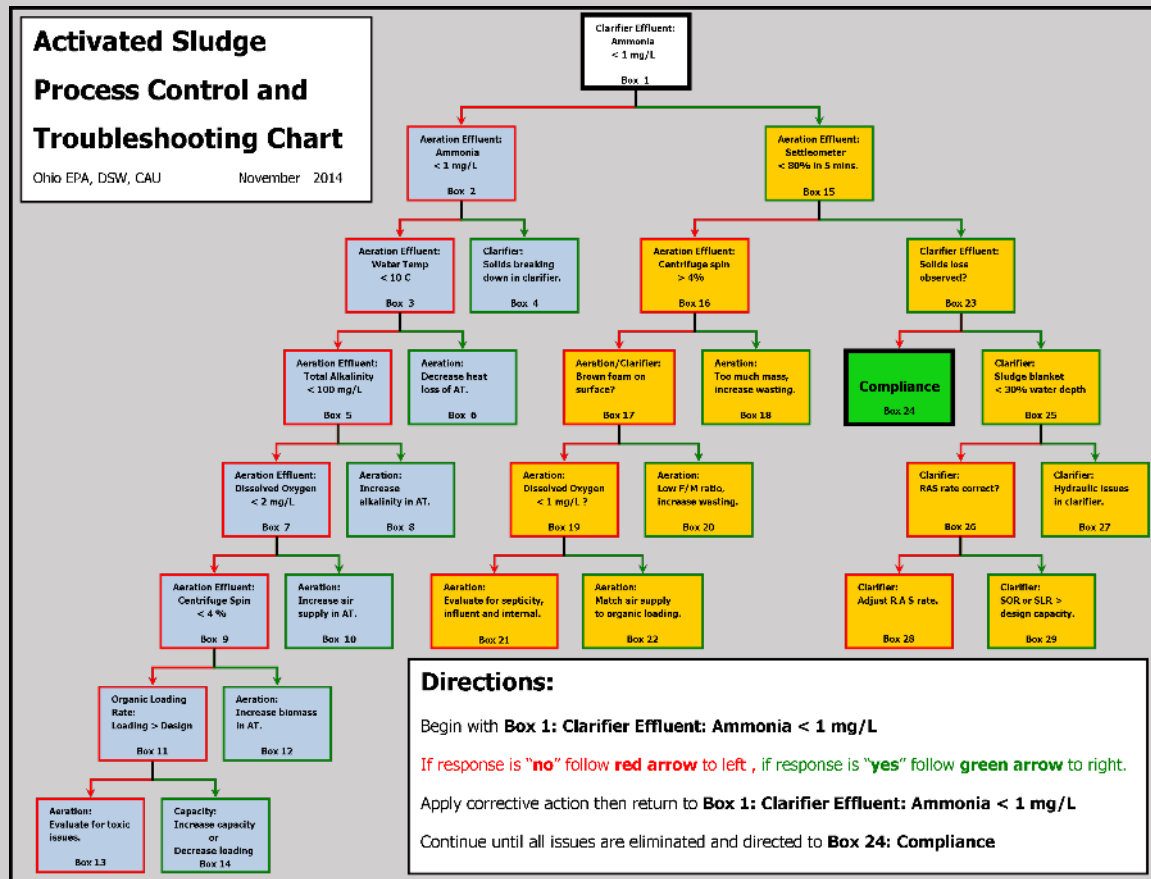


The Question...

Would **education and training**
be better than **enforcement**
in reducing Significant Noncompliance
at small treatment systems?

The Solution...

CAU had created the training material:



Activated Sludge Process Control and Troubleshooting



Training Manual

Division of Environmental and Financial Assistance
Division of Surface Water
Compliance Assistance Unit
August 2016

It is what we do...



...process control training
and troubleshooting
noncompliance
(decades of experience)

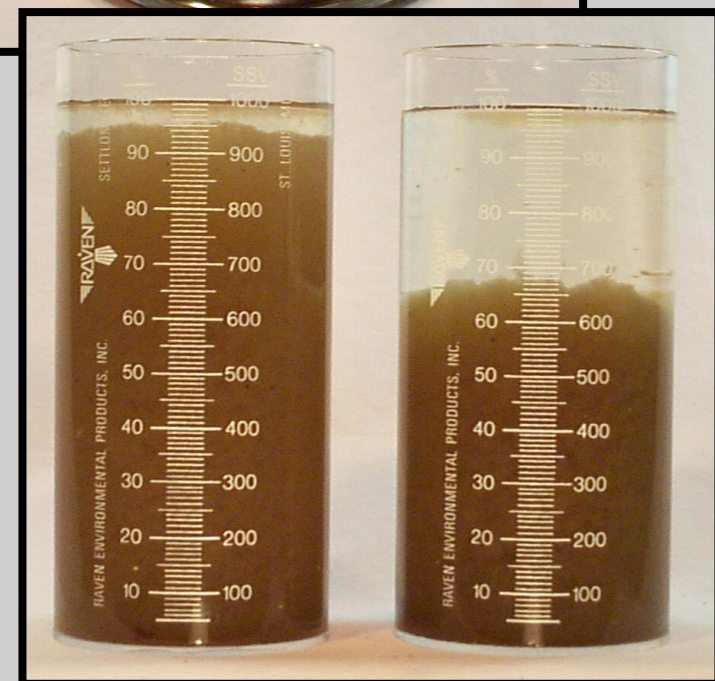
The Solution...

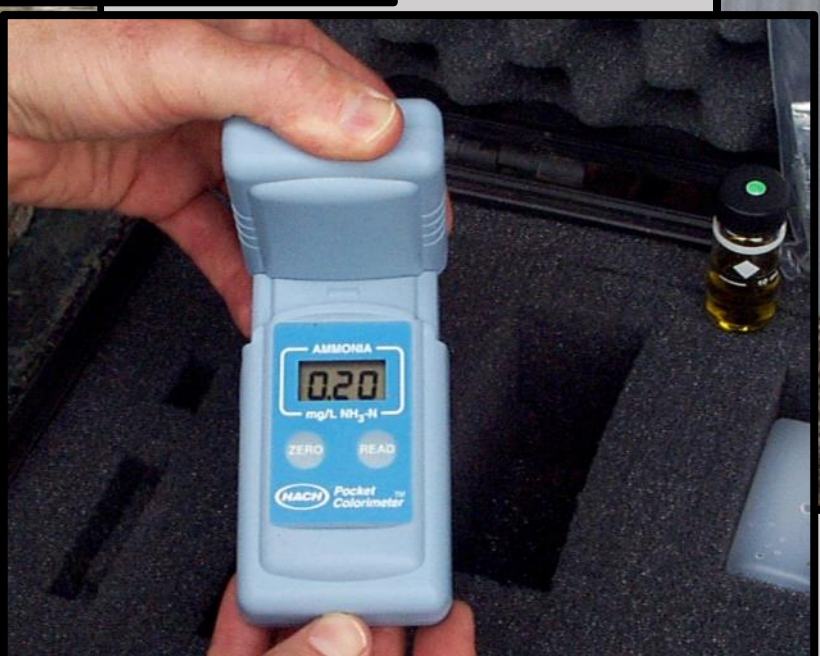
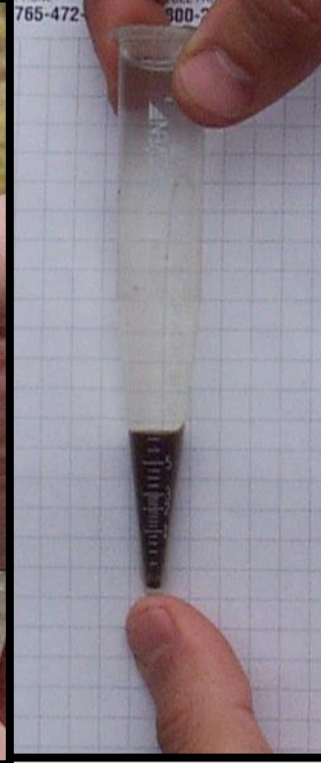
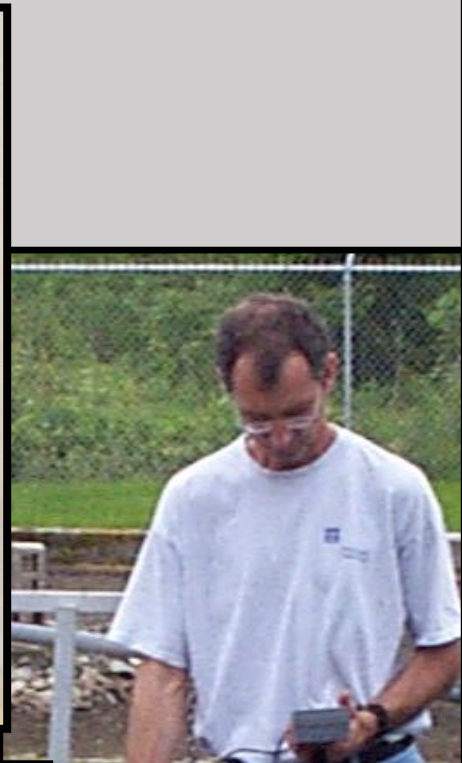
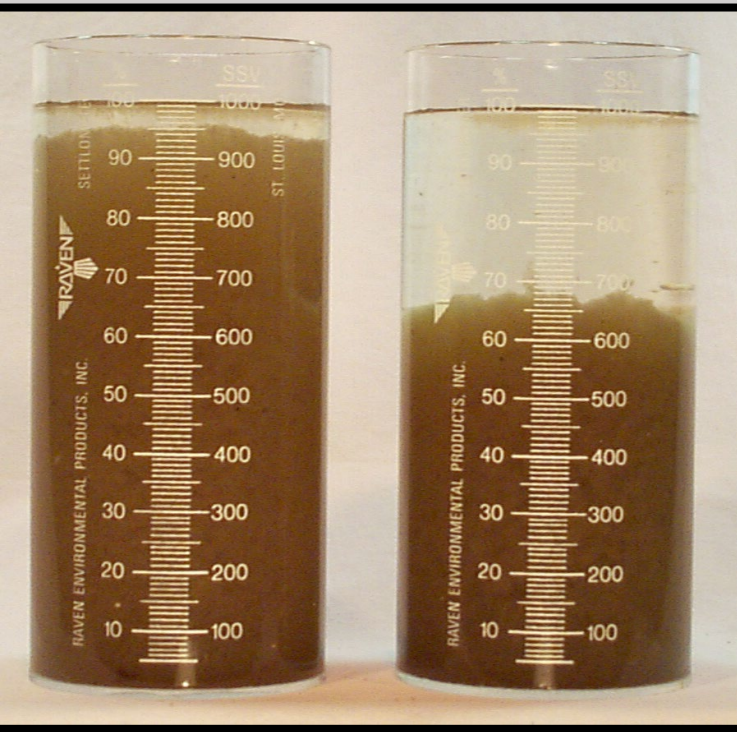
The missing pieces were the tools.

Training was successful when the operators had process control tools

Training was less successful when they couldn't purchase the tools

The Key is providing the tools to the operators





The Solution... The Package Plant Initiative

We **RECEIVED** a \$250,000 grant from Ohio Water Development Authority

- 1) to purchase process control tools and give them away
- 2) to print training manuals and give them away
- 3) to purchase big ticket items to stock a “tool library”
- 4) to pay for training venue rentals (when necessary)

The Solution

District Office / Central Office Staff Participated

- Kept everyone on track with organizational conference calls
- Maintained the lists of WWTPs
- Organized the call lists to operators and NPDES permit holders
- Pleaded with operators and NPDES permit holders to attend
- Assisted with the Show at the training venues
- Undoubtedly helped in ways that I wasn't even aware

The Plan

Three Hours Classroom Track

- Free Contact Hours

One Hour Hands On Tool Demonstration Track

- Repeatable at each of 2 or 3 package plants

Online Forum

- Free and anonymous (if desired)

Regroup Session

- Get together 4 weeks later to answer questions and brainstorm problems

Personal Assistance

- Cell numbers, email, site visits



The Numbers

District	WWTPs Invited	WWTPs Attended	Participants
NWDO	75	40	43
SWDO	40	20	34
SEDO	62	35	45
CDO	49	32	37
NEDO	172	102	96

Next Steps...

Number Crunching

- 1) Effectiveness of Training and Education to reduce SNC
- 2) Participants vs. Nonparticipants?
- 3) Ongoing Training?
 - Interest/participation
 - Budget for tools

Effectiveness of Training

Combined				
Year	WWTPs Attended	SNC	Compliant	%Compliance
2017	229	57	172	75
2018	229	68	161	70
2019	229	45	184	80

Stop the bleeding . . .

Attitude First

Enforcement

“Wastewater is easy . . .

. . . it’s the people that make it difficult.”

Education

“If you are competent, compliance is cheaper.”

“If you don’t measure, you’re just guessing.”

Stop the bleeding . . .

Big Picture

Look for trends

Target audience

facility type

parameter

location

Train target audience

Associations (MHPs, Campgrounds)



Stop the bleeding . . .

The Details

Capacity or operational issue

Tools to measure onsite
ammonia (conversion)
TSS (separation)
disinfection

Develop in house “expert”

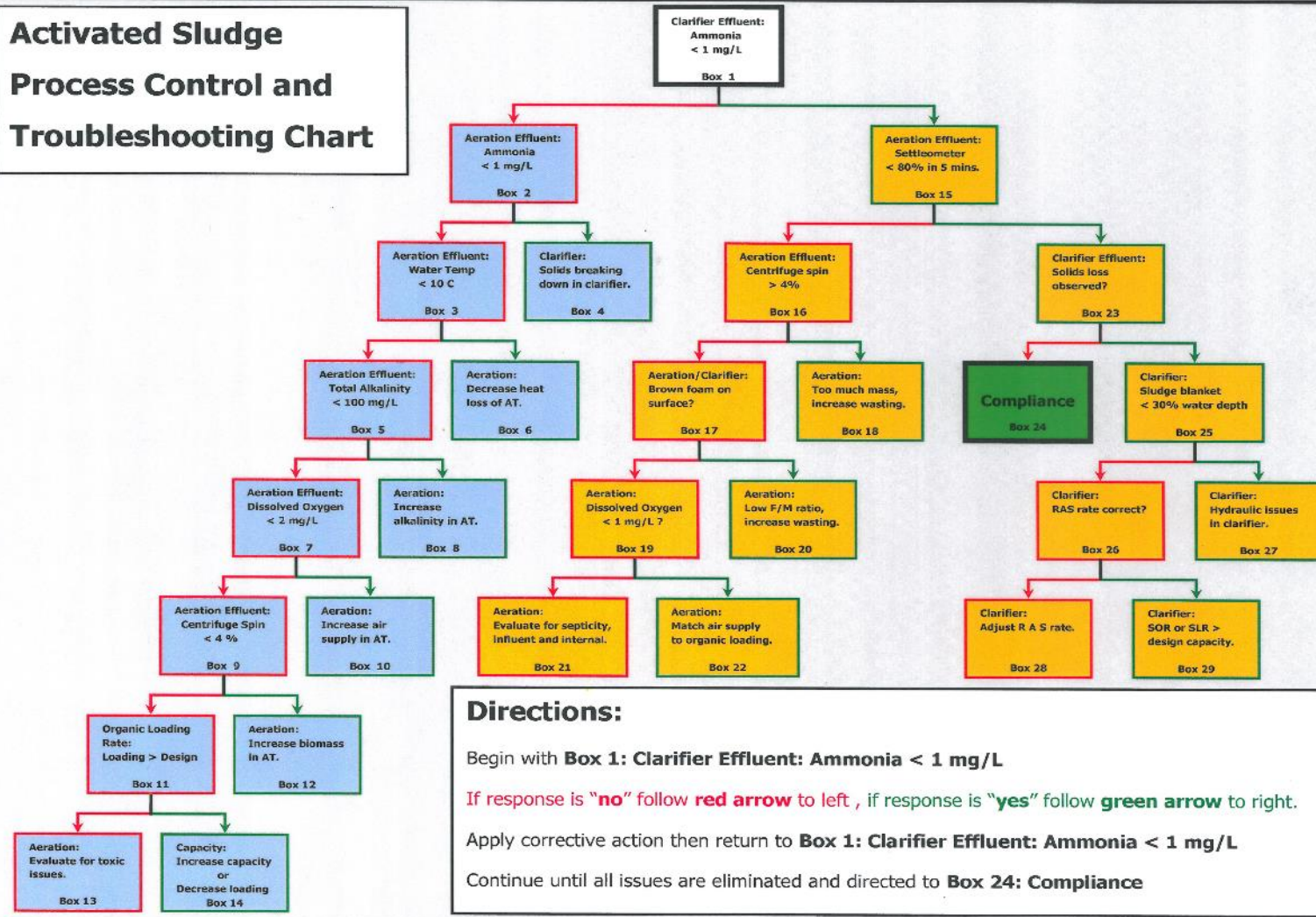
Meet with CAU for further training

Bring data/issues to discuss



Stop the bleeding . . .

Activated Sludge Process Control and Troubleshooting Chart



Directions:

Begin with **Box 1: Clarifier Effluent: Ammonia < 1 mg/L**

If response is "no" follow **red arrow** to left , if response is "yes" follow **green arrow** to right.

Apply corrective action then return to **Box 1: Clarifier Effluent: Ammonia < 1 mg/L**

Continue until all issues are eliminated and directed to **Box 24: Compliance**

Stop the bleeding . . .



Activated Sludge Process Control and Troubleshooting

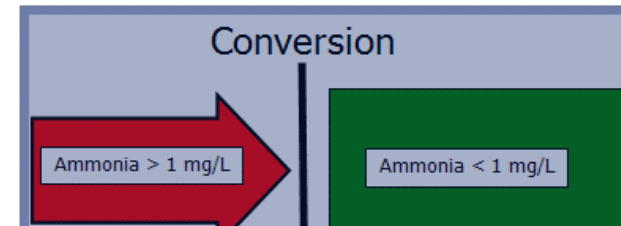


Training Manual

Division of Environmental and Financial Assistance
Division of Surface Water
Compliance Assistance Unit
August 2016

Clarifier Effluent Ammonia < 1 mg/L

- Wastewater contains pollutants in the form of carbon (cBOD) and ammonia nitrogen (NH_3).
- Bacteria in the aeration tank convert these pollutants into new bacterial cells (biomass) and more desirable forms of carbon (CO_2) and nitrogen (NO_3), thus preventing degradation of the receiving stream.
- Nitrifying bacteria in the aeration tank convert the incoming ammonia nitrogen to the less objectionable form of nitrogen called nitrate (NO_3). These nitrifying bacteria are very sensitive to environmental conditions for growth. Due to this sensitivity, monitoring the conversion of ammonia to nitrate provides an "early warning" indicator of when an adjustment to the process is necessary. Anything which limits the effectiveness of the nitrifying bacteria to convert ammonia to nitrate will cause the aeration tank effluent ammonia concentrations to increase, an indication of loss of control.
- Typically, if the ammonia nitrogen concentration from the aeration tank effluent is < 1 mg/L, it is assumed that both of the major pollutants (cBOD and NH_3) have been successfully converted, therefore the treatment objective of the aeration tank (conversion) is now complete.



<https://epa.ohio.gov/defa/CAU>

. . hope for recovery.

QUESTIONS?

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Effectiveness of Training

NWDO Workshop Date: October 15, 2015				
Year	WWTPs Attended	SNC	Compliant	% Compliant
2017	40	7	33	82
2018	40	8	32	80
2019	40	7	33	82

Effectiveness of Training

SWDO Workshop Date: April 26, 2016				
Year	WWTPs Attended	SNC	Compliant	% Compliant
2017	20	6	29	70
2018	20	5	30	75
2019	20	3	32	85

Effectiveness of Training

SEDO Workshop Date: August 24, 2016				
Year	WWTPs Attended	SNC	Compliant	% Compliant
2017	35	12	23	66
2018	35	13	22	63
2019	35	10	25	71

Effectiveness of Training

CDO Workshop Date: November 3, 2016				
Year	WWTPs Attended	SNC	Compliant	% Compliant
2017	32	15	20	53
2018	32	17	18	47
2019	32	13	22	59

Effectiveness of Training

NEDO Workshop Date June 7 and June 13, 2017				
Year	WWTPs Attended	SNC	Compliant	% Compliant
2017	102	17	85	83
2018	102	25	77	75
2019	102	12	90	88