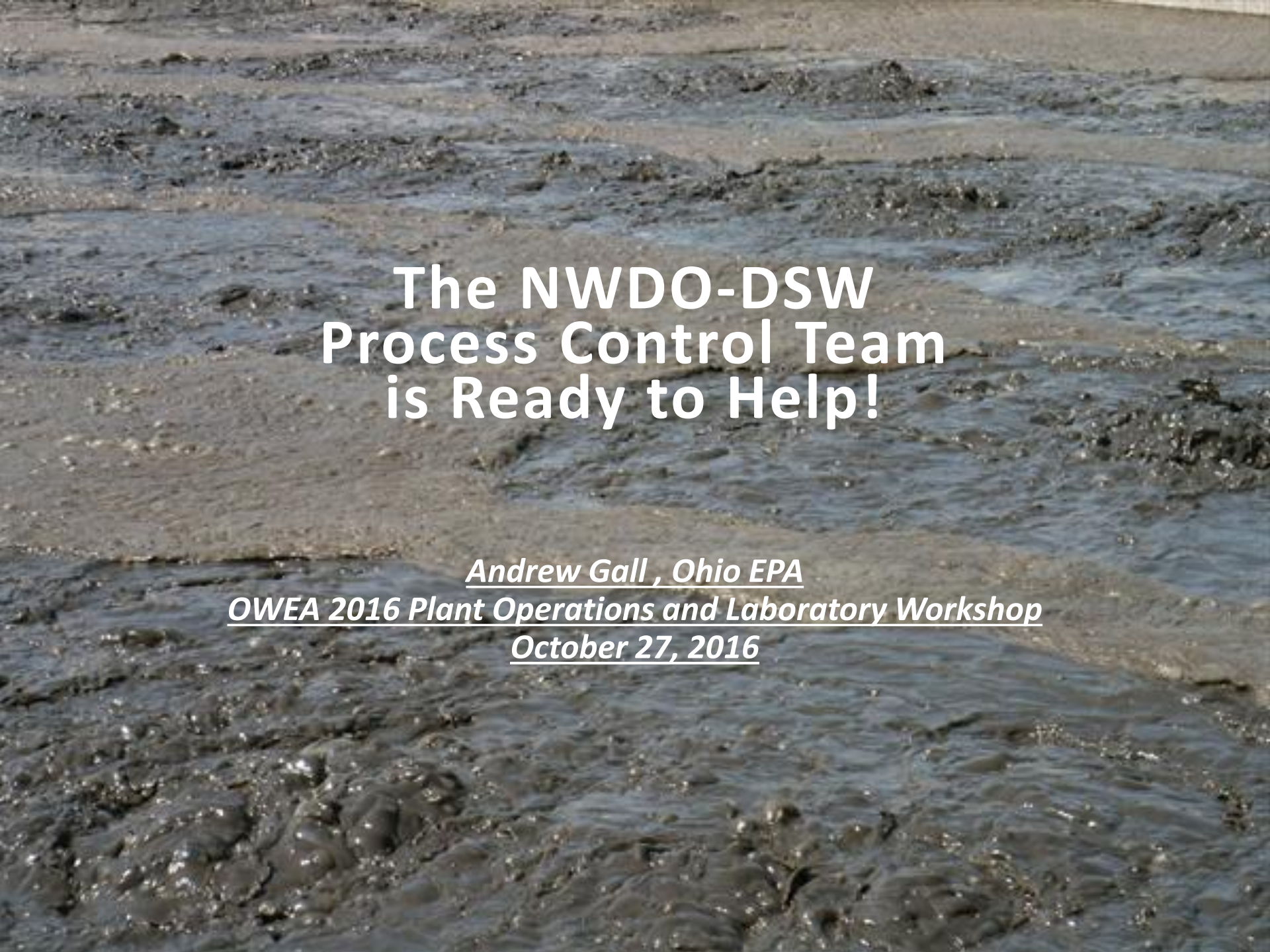


The NWDO-DSW Process Control Team is Ready to Help!

Andrew Gall , Ohio EPA

OWEA 2016 Plant Operations and Laboratory Workshop

October 27, 2016

Strategies for Compliance Assistance

- Why is assistance needed?
- Strategies: Administrative and Hands-on.
- Package Plant Process Control
- Hands-on case study

Ohio Environmental Protection Agency

Why is Assistance Needed?

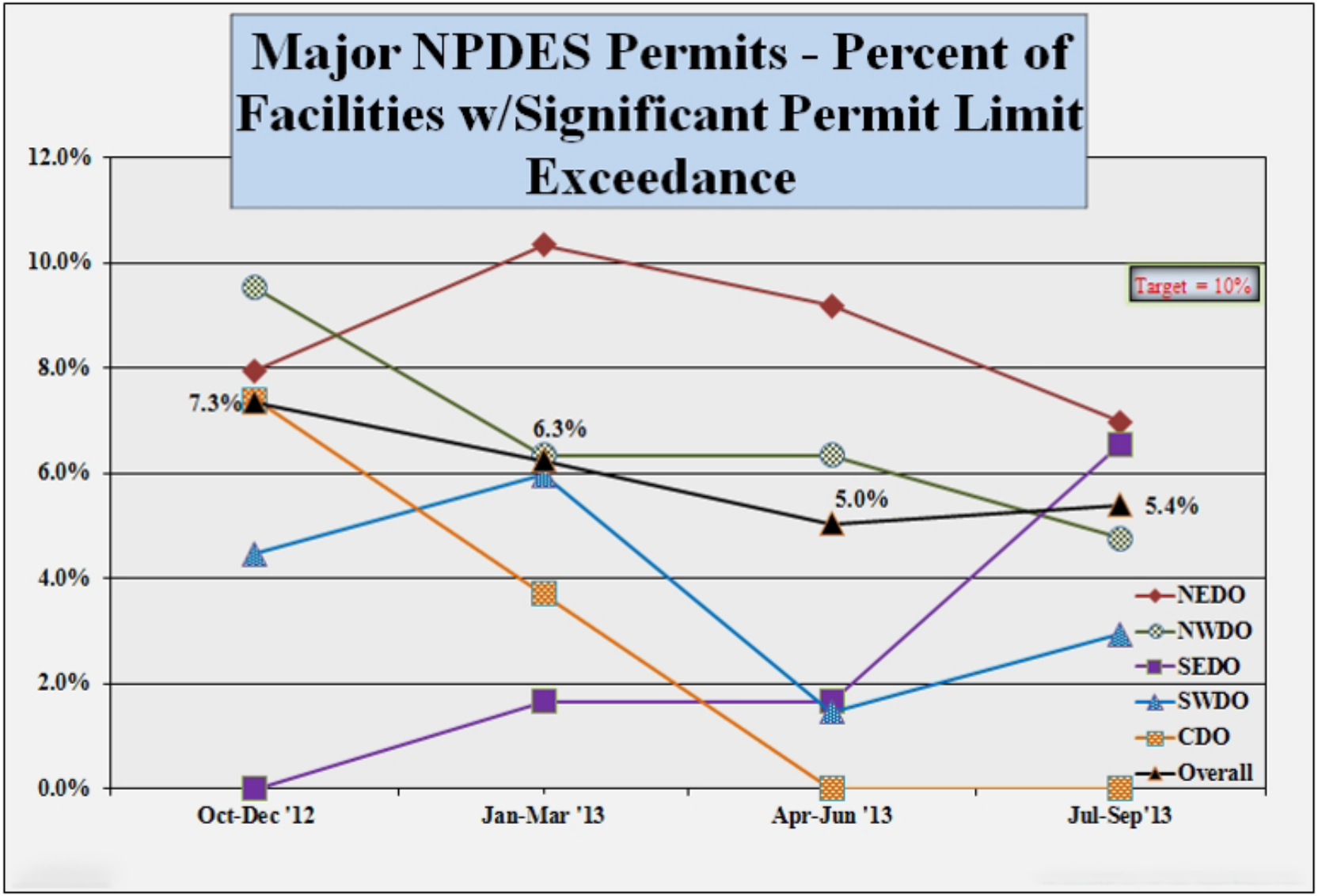
- In 2012
  - Seven to eight percent non-compliance rate for major facilities.
    - Half of the national average.
  - 22 percent non-compliance rate for minor facilities.
    - More than 300 facilities not compliant with effluent limits.

Ohio Environmental Protection Agency

Significant Non-Compliance (SNC)

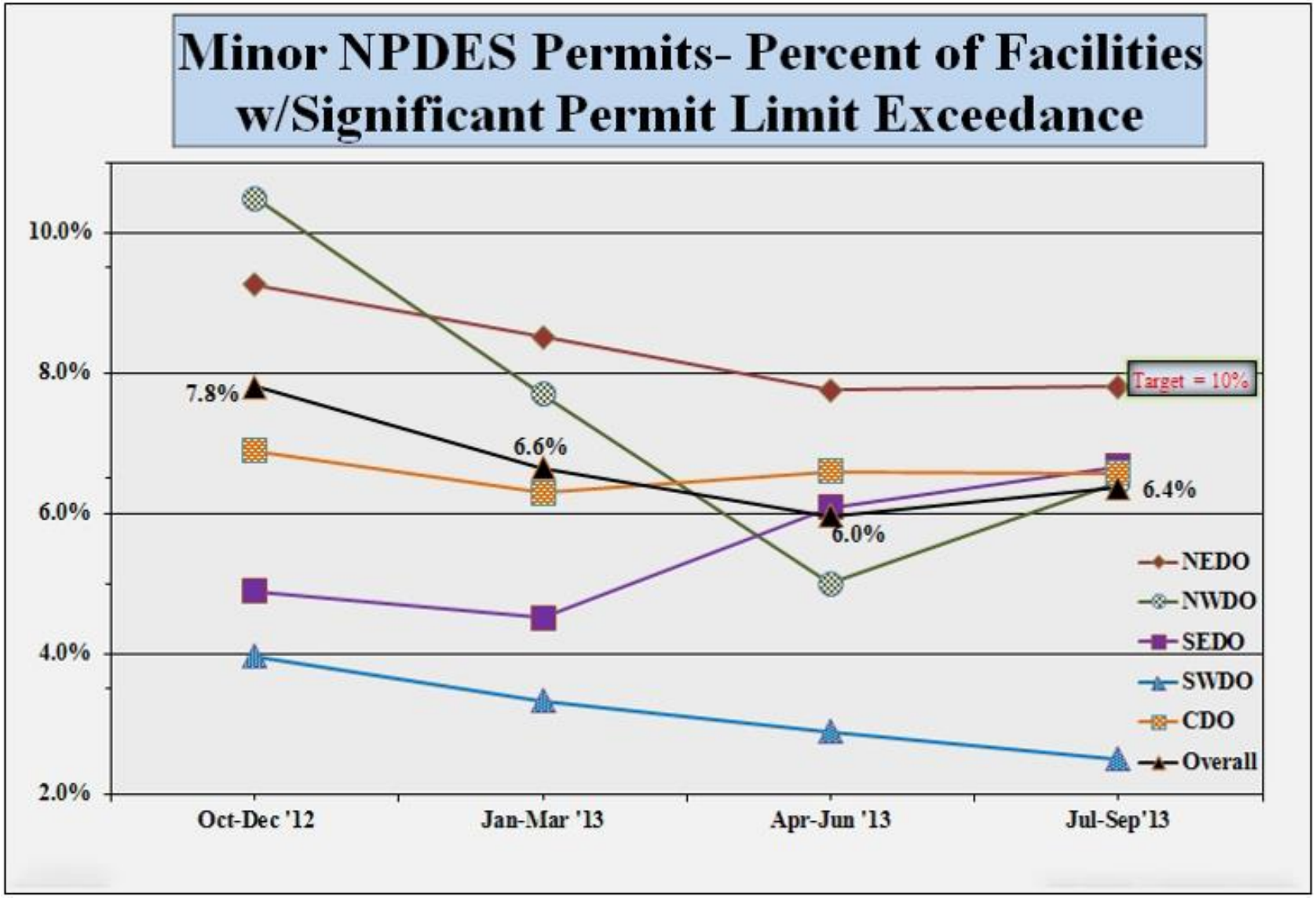
- 40 percent exceedance of conventional pollutant for two or more months during six-month review period.
- 20 percent exceedance of toxic pollutants for two or more months during six-month review period.
- Violation of the same parameter for four or more months during six-month review period.

Ohio Environmental Protection Agency



Ohio Environmental Protection Agency

Minor NPDES Permits- Percent of Facilities w/Significant Permit Limit Exceedance



Ohio Environmental Protection Agency

Compliance Rates

	October -December 2012			January - March 2013			April - June 2013			July - September 2013		
	# in SNC	Total permits	%	# in SNC	Total permits	%	# in SNC	Total permits	%	# in SNC	Total permits	%
Major	18	245	7.30%	19	304	6.30%	14	278	5.00%	15	278	5.40%
Minor	248	3180	7.80%	211	3176	6.60%	190	3178	6.00%	203	3190	6.40%
All	266	3425	7.80%	230	3480	6.60%	204	3465	5.90%	218	3468	6.30%

Ohio Environmental Protection Agency

Administrative Strategy: Preliminary Compliance Review (PCR)

- Screening of all DMRs submitted within 24 hours.
- PCRs are sent to email address attached to eDMR account.
- NPDES permit requires response to Ohio EPA.

Ohio Environmental Protection Agency

Administrative Strategy: Notice of Violation (NOV)

- NOVs are issued based off DMRs that are submitted to Ohio EPA.
- Include a list of violations, language regarding possible penalty, description of steps to return to compliance.

Ohio Environmental Protection Agency

Administrative Strategy: NOV Response

- If the violation was intermittent, explain why.
- If the WWTP has already taken steps to address the violation, provide details of actions.
- If the violation still needs to be addressed, provide a timeline with specific actions that you will complete to come back into compliance.

Ohio Environmental Protection Agency

Administrative Strategy: Significant Non-Compliance (SNC) List

- SNC list generated and reviewed quarterly.
- Facilities in SNC are contacted by district staff.
- Ohio EPA staff must complete a Compliance and Enforcement plan.

Ohio Environmental Protection Agency

Administrative Strategy: Compliance and Enforcement Plans (CEPs)

- CEPs are drafted by the district office to document a facility's return to compliance approach.
- Reviewed by enforcement supervisor and Central Office staff.
- Used as a basis for enforcement cases.

Ohio Environmental Protection Agency

Hands-on Strategy:

- Ohio EPA staff work with the operator to determine the causes for non-compliance.
- Onsite visit with Ohio EPA staff, utilizing tools to evaluate the plant performance.

Ohio Environmental Protection Agency

Ohio EPA Compliance Assistance Unit

Ohio Environmental Protection Agency

NWDO Hands-on Strategy

- NWDO staff received training and guidance from the Ohio EPA Compliance Assistance Unit. Presentations and hands-on days in the field.

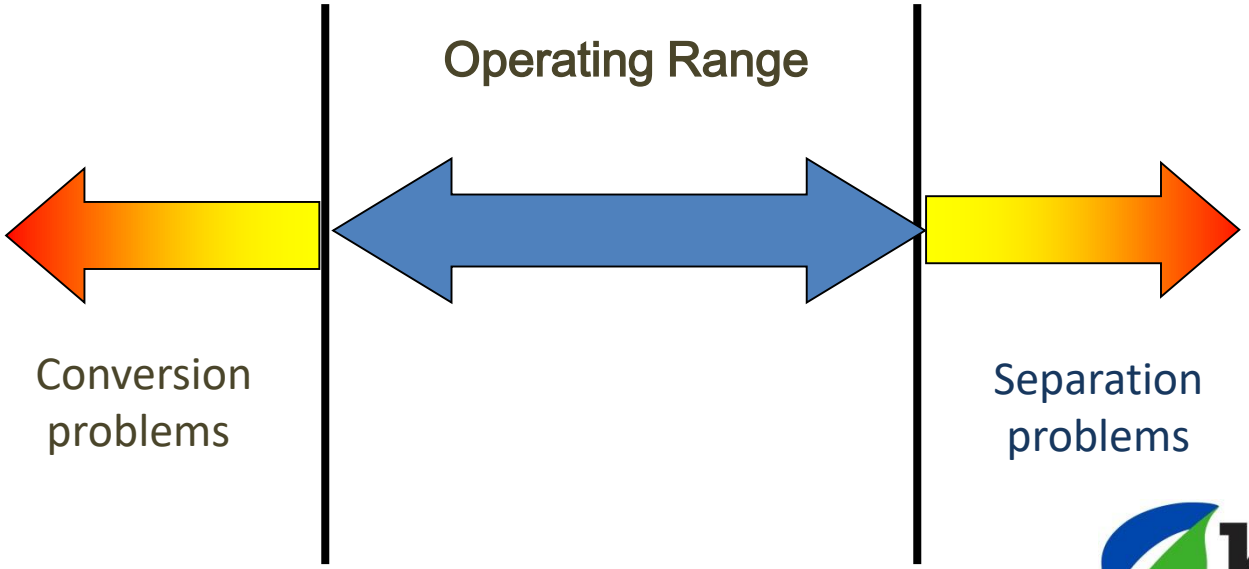
- NWDO-DSW manager approves purchase of compliance assistance tools and inspectors start using it while inspecting package plants.

Ohio Environmental Protection Agency

Controlling the Activated Sludge System

Two Key concepts:

1. **Convert** organic waste into bugs
2. **Separate** bugs from treated water



Ohio Environmental Protection Agency

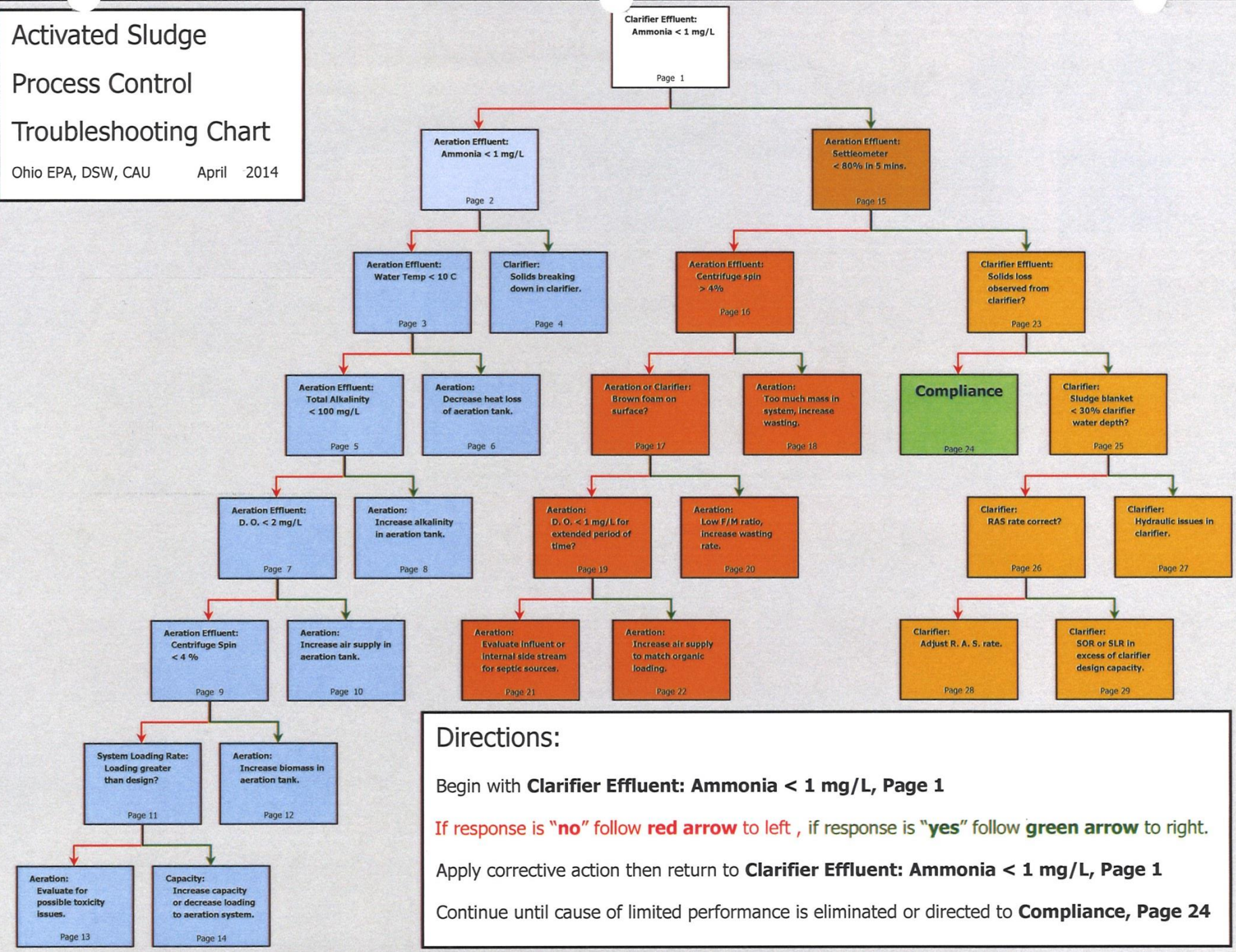
Approach to Evaluating a Plant

- Conversion
  - Ammonia to Nitrate-Nitrite
  - Alkalinity
- Separation
  - Keeping solids in the WWTP

Ohio Environmental Protection Agency

Activated Sludge Process Control Troubleshooting Chart

Ohio EPA, DSW, CAU April 2014



Directions:

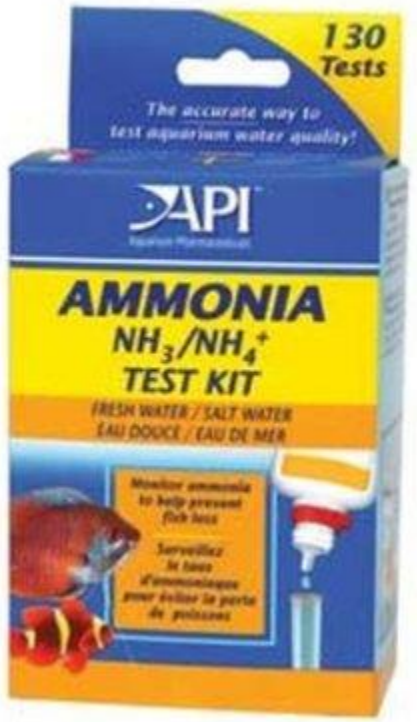
Begin with **Clarifier Effluent: Ammonia < 1 mg/L, Page 1**

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

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

Continue until cause of limited performance is eliminated or directed to **Compliance, Page 24**

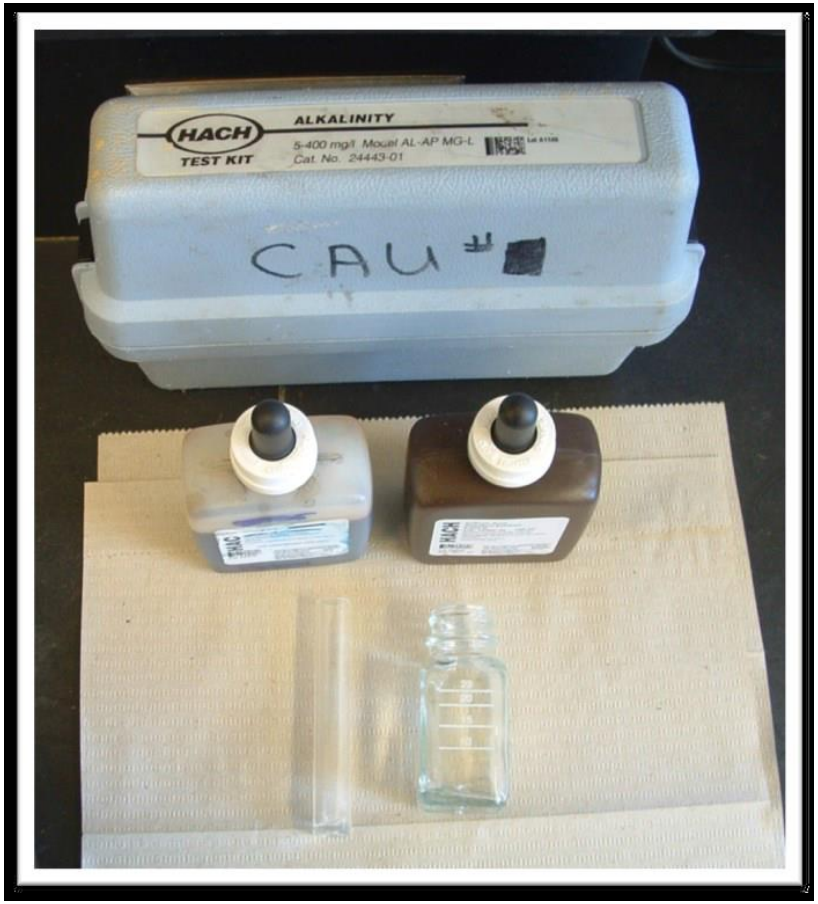
Ammonia Test Kit



- Check clarifier effluent Ammonia to verify conversion is complete.
- Goal is < 1.0 mg/l
- Five-minute test
- 130 tests for less than $10
- Non-reportable method

Ohio Environmental Protection Agency

Alkalinity Test Kit



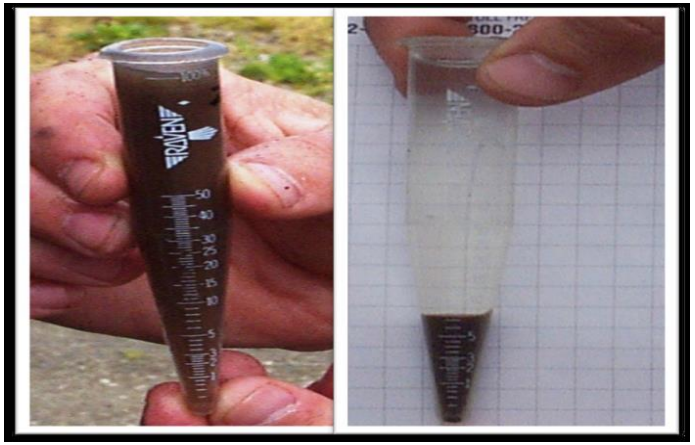
- Ammonia > 1 mg/l indicates conversion problem.

Troubleshoot

- Alkalinity (7.14 parts per 1 mg/l NH3)
- Dissolved Oxygen
- Temperature
- Clarifier Solids

Ohio Environmental Protection Agency

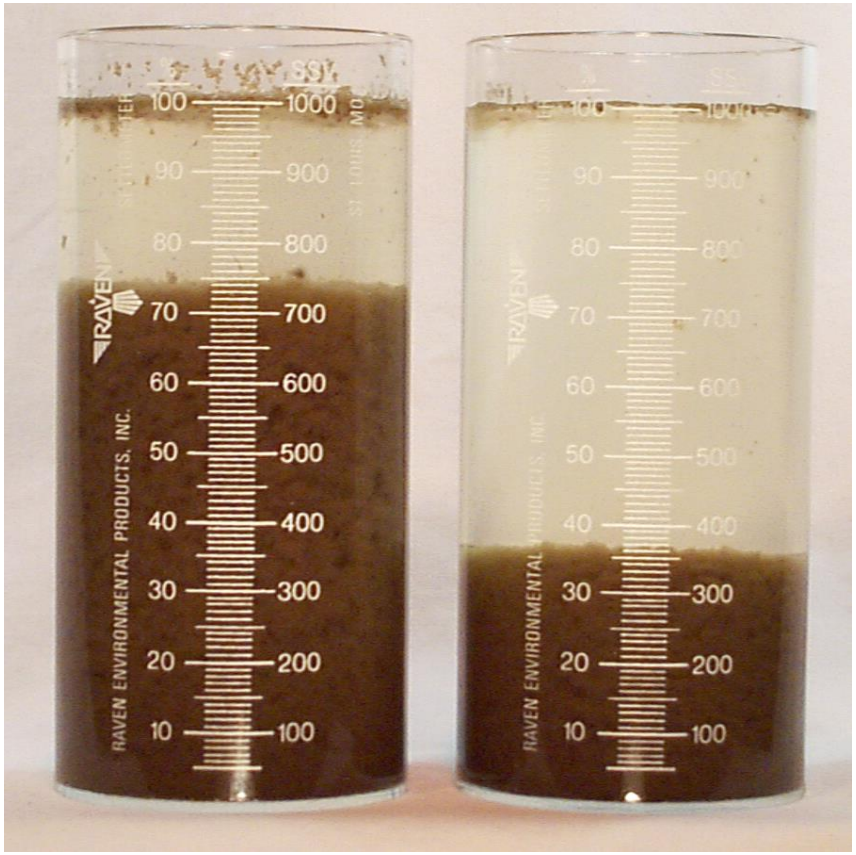
Centrifuge



- 15 minutes
- Spin samples from aeration tank, clarifier, sludge returns to evaluate solids concentration

Ohio Environmental Protection Agency

Settleometer



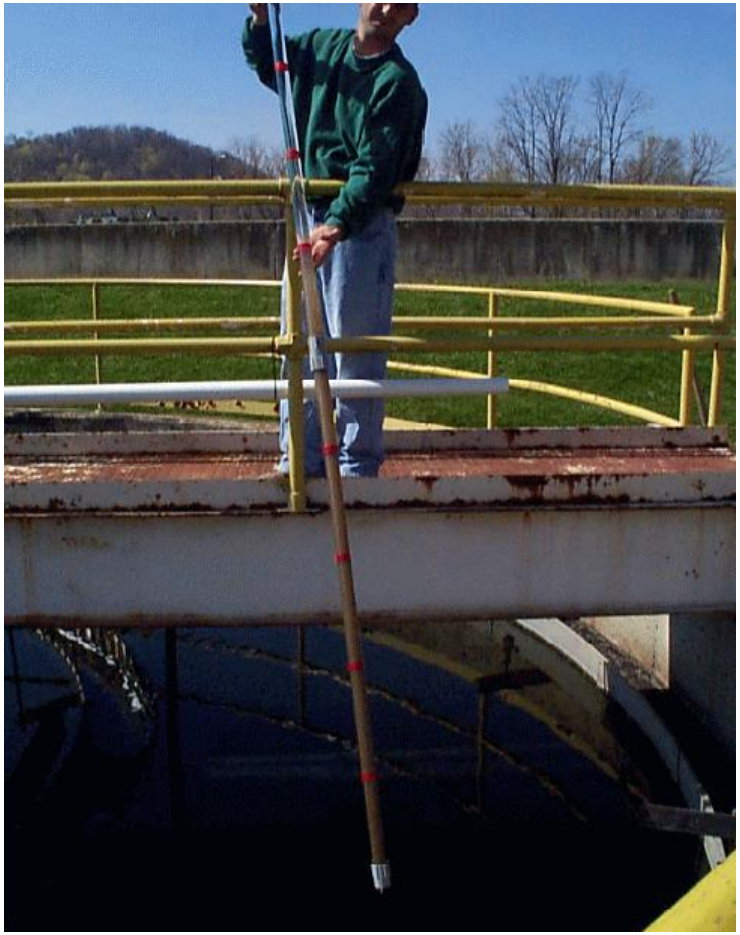
Guideline Parameters:

< 800 mL in five minutes

< 400 mL in 30 minutes

Ohio Environmental Protection Agency

Sludge Judge



Recommend maximum clarifier blanket of 20 percent of water depth

Ohio Environmental Protection Agency

Process Control Reporting sheet

Date_____ Facility_____ Design Flow_____

Conversion

Clarifier effluent Ammonia ____mg/l Aeration tank effluent ammonia ____mg/l

Alkalinity ____ mg/l Temperature_____ Aeration tank Dissolved Oxygen_____mg/l

Separation

Settlometer

(5mins) _____ml (10mins) _____ml (15mins) _____ml (20mins) ____ml (25 mins)____ml (30mins)_____ml

Core Sampler

sludge depth_____ft

_____% of side water depth

Centrifuge Spin 15 min

RAS %____ (target double the aeration basin%)

Aeration tank %____ (range 2% to 4%)

Ohio Environmental Protection Agency

NWDO Success

- NWDO staff and operators work together to evaluate plant and let results guide the conclusion.
- Improved plant operations and better understanding of issues help facilities return to compliance sooner.
- Facilities can purchase low-cost equipment and use strategies to remain in compliance.

Ohio Environmental Protection Agency

NWDO Success

- Fosters collaborative relationship between NWDO staff and plant operators and facility owners.
- Helps improves skills of NWDO inspectors.

Ohio Environmental Protection Agency

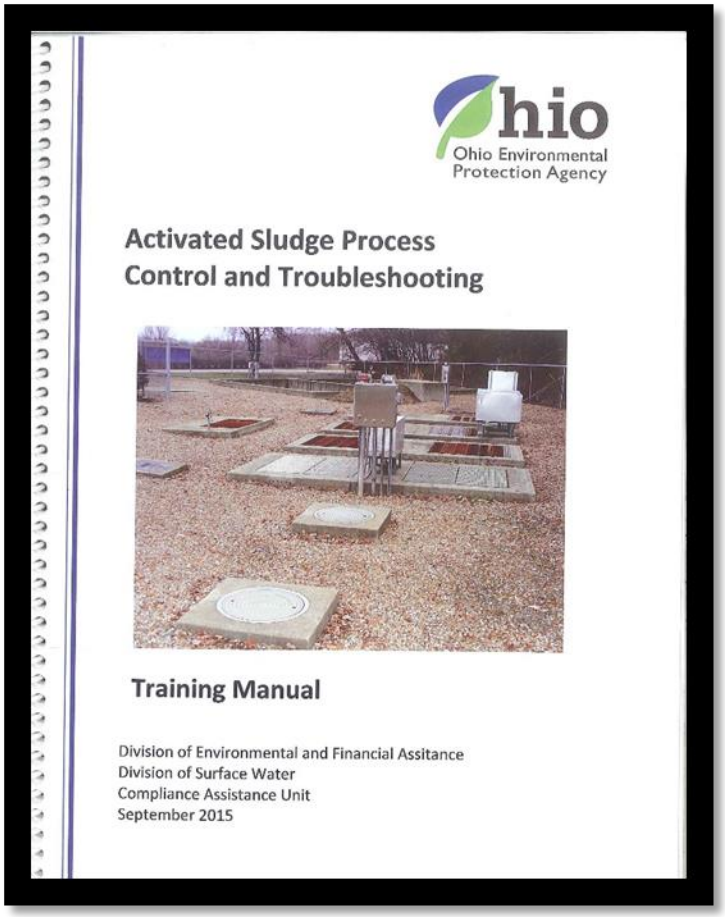
Statewide Implementation

- In 2015, Ohio EPA partnered with the Ohio Water Development Authority (OWDA) to create a structured program to offer this assistance to small wastewater treatment plants across the state free of cost.

Ohio Environmental Protection Agency

Statewide Implementation

- A training session (five contact hours: in-class and onsite)
- An Activated Sludge Process Control and Troubleshooting Manual

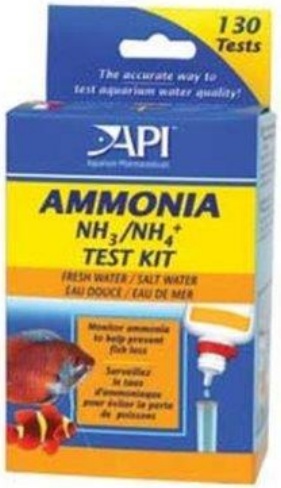


Ohio Environmental Protection Agency

Statewide Implementation

Process Control Tool Kit

- Ammonia Test Kit
- Orthophosphate Test Kit
- Settleometer
- Alkalinity Test Kit
- Core Sampler



Ohio Environmental Protection Agency

Statewide Implementation

<u>District Office Tool Library</u>

- 10 Centrifuges
- 10 Dissolved Oxygen Meters
- Operators that attend training can borrow this higher cost equipment for use at their plant

Ohio Environmental Protection Agency

Statewide Implementation

- November 2015 – NWDO Training in Fremont
  - Morning session Presentation of Concepts
  - Afternoon hands-on session using tools

  - 74 facilities on SNC list invited to NWDO training
  - 43 facilities attended

Ohio Environmental Protection Agency

Positive Feedback

"The tools and training have been a big help and I have seen an improvement in both of my plants since implementing them. Thank you for the learning opportunity and for providing me with some helpful tools".

- A plant operator

Ohio Environmental Protection Agency

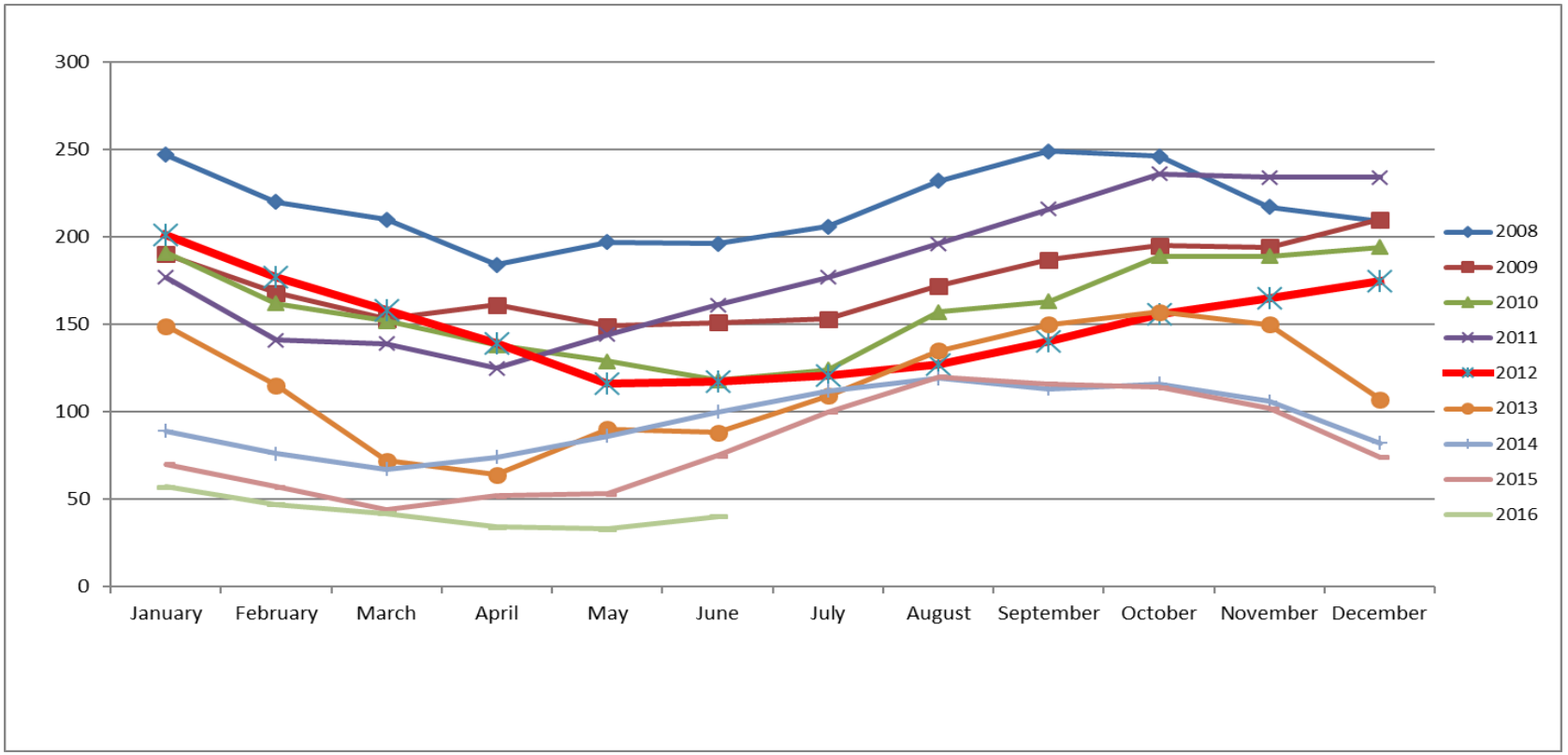
Positive Feedback

Thank you and your team for hosting this workshop and also for the operational tools. This collaboration between treatment operators and the EPA is a must to secure the future of our valuable resources. Thank you again.

- A Village Wastewater Director

Ohio Environmental Protection Agency

How are we doing?
NWDO Stations in SNC 2008 - 2016



Ohio Environmental Protection Agency

How are we doing after one year?

- As of October 2016:
  - 37 of 43 NWDO systems have returned to compliance following the training
  - NWDO continues to work with the six facilities in SNC
  - **D.O. Meters and centrifuges from the Tool Library are now available to all facilities within NWDO**

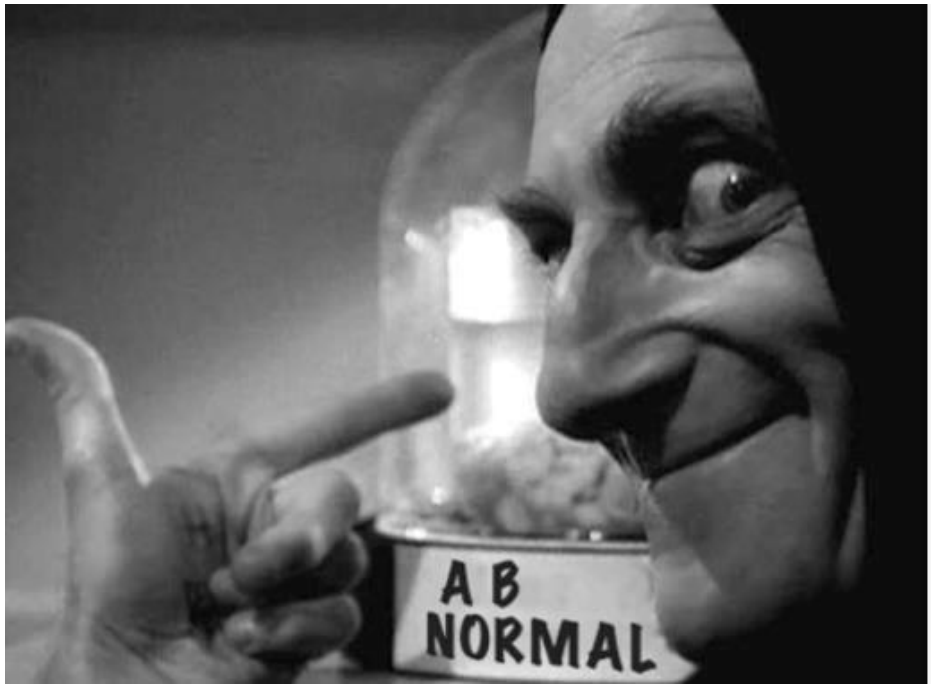
Ohio Environmental Protection Agency

Summer 2016 Case Study

NWDO Staff and CAU use tools to evaluate a WWTP upset and help the facility return to compliance.

Ohio Environmental Protection Agency

Background



Ohio Environmental Protection Agency

Background

- Facility notifies NWDO that they experienced an upset event in late May, early June, 2016.
- Effluent sample results indicated high ammonia, high BOD, high Total Suspended Solids and high E.coli.
- Facility tries several things to aid in plant recovery but has minimal success.

Ohio Environmental Protection Agency

Background

- Facility contacts DEFA and requests helps from compliance assistance unit.
- Jon VanDommelen and NWDO staff visit the plant and use the tools and “work the chart” to evaluate plant conditions.
- Facility consists of oxidation ditch, two final clarifiers, aerobic digestion and UV disinfection and has a design flow of 1MGD.

Ohio Environmental Protection Agency

The NWDO Compliance Unit

Ohio Environmental Protection Agency

Five-Minute Settleometer

- Sample of oxidation ditch effluent.
- Five-minute Settleometer reading of 910.
- Remember — should be less than 800.

Ohio Environmental Protection Agency

Two-Minute Diluted Settlometer

- Half oxidation ditch effluent and half clarifier effluent.
- Two-minute reading of 800.

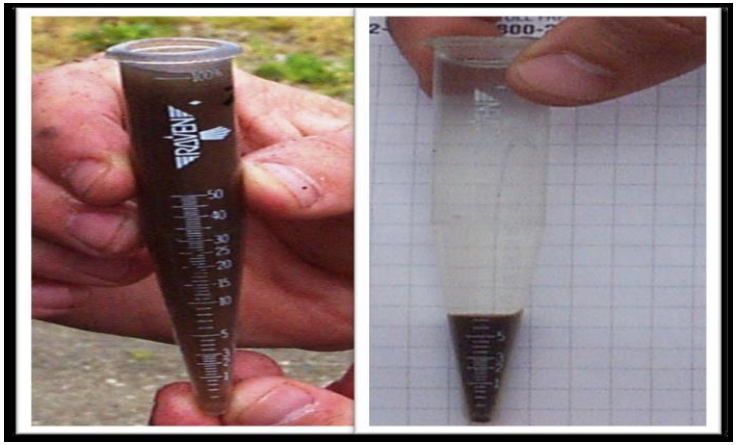
Ohio Environmental Protection Agency

Dissolved Oxygen Meter

- Raw Influent D.O. reading was – 4.99 mg/l.
- Across 3 rings of oxidation ditch average D.O. was 0.30 mg/l.

Ohio Environmental Protection Agency

Conversion Tools: Centrifuge



- Spun samples from each ring of oxidation ditch to evaluate solids concentration.
- Readings across the ditch of approximately 5.0.

Ohio Environmental Protection Agency

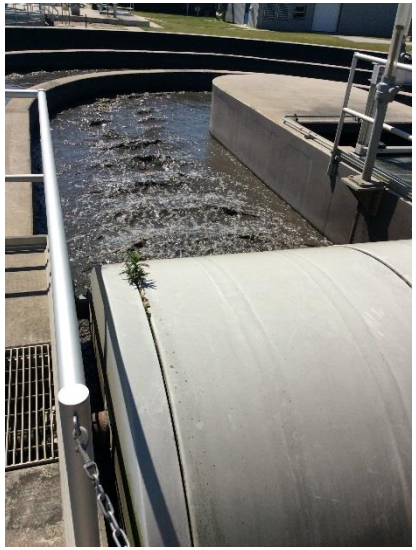
Ammonia Readings

- Readings across the oxidation ditch were high.
- Outer Ring 22.0 mg/l
- Inner Ring 8.0 mg/l
- Goal of less than 1.0 at end of aeration

Ohio Environmental Protection Agency

What to do?

- Need to increase dissolved oxygen levels in oxidation ditch.
  - Raised weir on ditch to increase the depth of rotors in the water.



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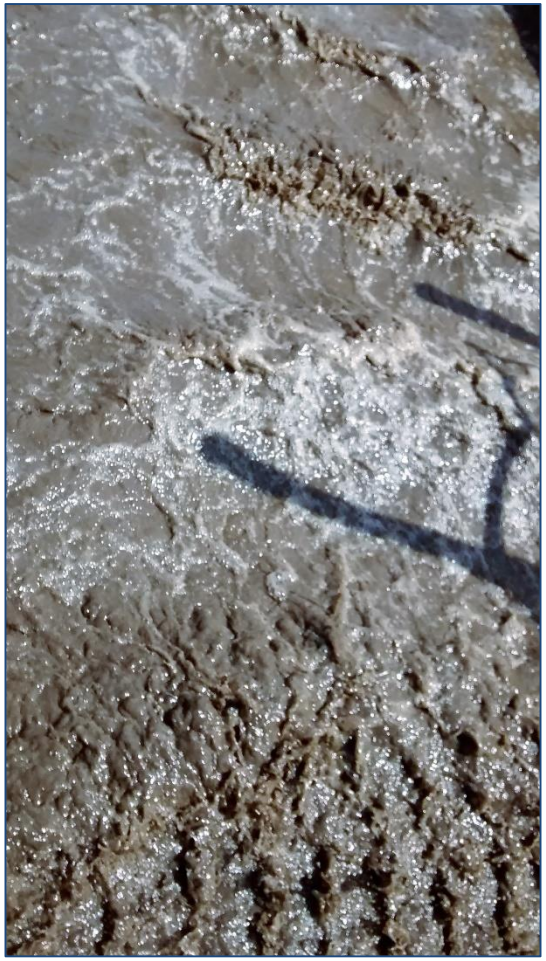
Step 1 – Increase Wasting



- Need to waste sludge from the system.
  - Increased sludge wasting pump rate.
  - Use centrifuge spin to monitor progress.
  - Target spin of 2.5.

Ohio Environmental Protection Agency

Step 2 - Increase D.O.

- Need to increase dissolved oxygen levels in oxidation ditch.
  - Raised weir on ditch to increase the amount of rotors in the water, which helped increase D.O.

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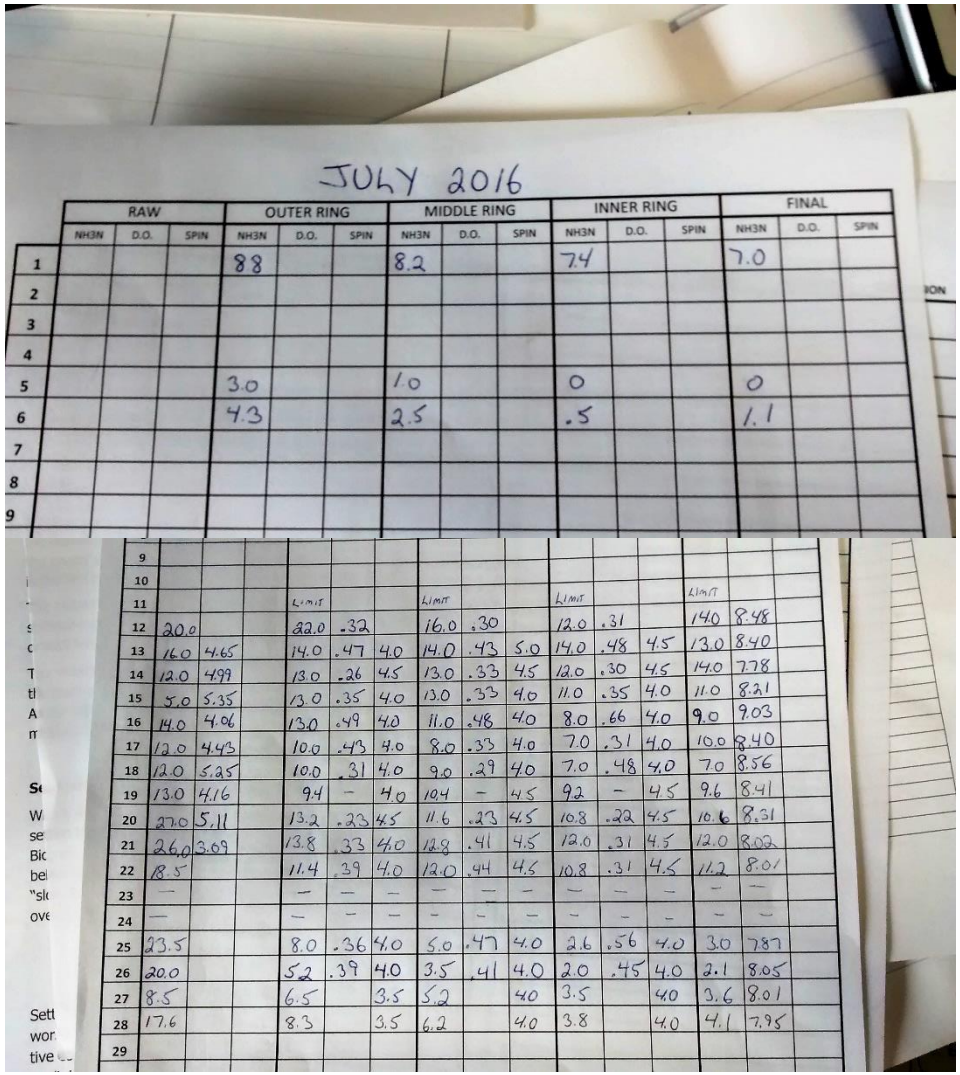
Is it working???



JULY 2016

	RAW			OUTER RING			MIDDLE RING			INNER RING			FINAL		
	NH3N	D.O.	SPIN	NH3N	D.O.	SPIN	NH3N	D.O.	SPIN	NH3N	D.O.	SPIN	NH3N	D.O.	SPIN
1				88			8.2			7.4			7.0		
2															
3															
4															
5				3.0			1.0			0			0		
6				4.3			2.5			.5			1.1		
7															
8															
9															
10															
11				Limit			Limit			Limit			Limit		
12	20.0			22.0	.32		16.0	.30		12.0	.31		14.0	8.48	
13	16.0	4.65		14.0	.47	4.0	14.0	.43	5.0	14.0	.48	4.5	13.0	8.40	
14	12.0	4.99		13.0	.26	4.5	13.0	.33	4.5	12.0	.30	4.5	14.0	7.78	
15	5.0	5.35		13.0	.35	4.0	13.0	.33	4.0	11.0	.35	4.0	11.0	8.21	
16	14.0	4.06		13.0	.49	4.0	11.0	.48	4.0	8.0	.66	4.0	9.0	9.03	
17	12.0	4.43		10.0	.43	4.0	8.0	.33	4.0	7.0	.31	4.0	10.0	8.40	
18	12.0	5.25		10.0	.31	4.0	9.0	.29	4.0	7.0	.48	4.0	7.0	8.56	
19	13.0	4.16		9.4	–	4.0	10.4	–	4.5	9.2	–	4.5	9.6	8.41	
20	27.0	5.11		13.2	.23	4.5	11.6	.23	4.5	10.8	.22	4.5	10.6	8.31	
21	26.0	3.09		13.8	.33	4.0	12.8	.41	4.5	12.0	.31	4.5	12.0	8.02	
22	18.5			11.4	.39	4.0	12.0	.44	4.5	10.8	.31	4.5	11.2	8.01	
23	–			–	–	–	–	–	–	–	–	–	–	–	
24	–			–	–	–	–	–	–	–	–	–	–	–	
25	23.5			8.0	.36	4.0	5.0	.47	4.0	2.6	.56	4.0	3.0	7.87	
26	20.0			5.2	.39	4.0	3.5	.41	4.0	2.0	.45	4.0	2.1	8.05	
27	8.5			6.5		3.5	5.2		4.0	3.5		4.0	3.6	8.01	
28	17.6			8.3		3.5	6.2		4.0	3.8		4.0	4.1	7.95	
29															

Record the results and let them guide you!!

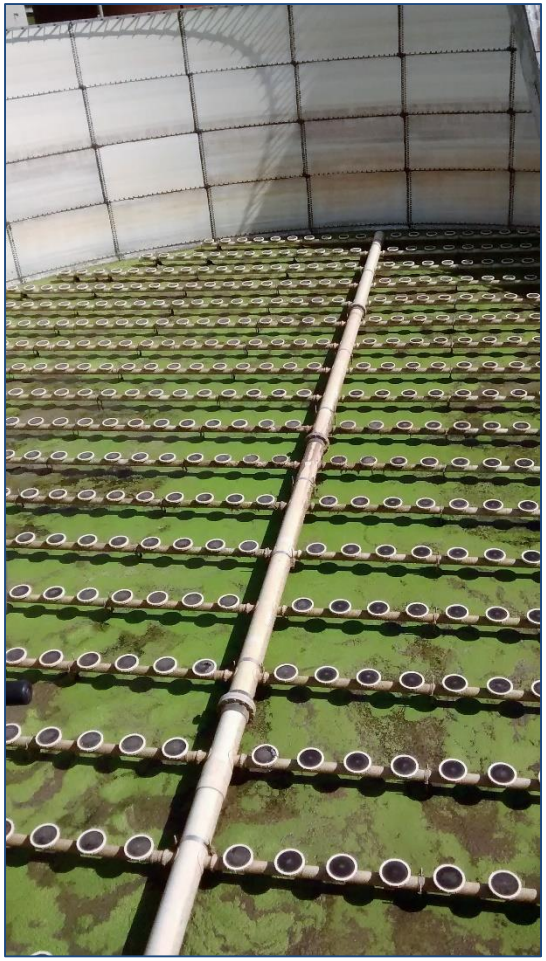
Ohio Environmental Protection Agency

Too Many Solids

- Facility digesters and sludge holding tanks are full.
- Need room to waste sludge from plant.
- Starts wasting to old drying beds with polymer and contracts with a hauler to haul liquid.

Ohio Environmental Protection Agency

Sludge has been hauled



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Results

- With slow and steady effort by the facility operators, as the solids in the system went down the D.O. increased, the ammonia values went down and settling improved and effluent was back into compliance.

Ohio Environmental Protection Agency

Results

- The operators ran process control tests daily all summer and determined their operational window.
- Operators no longer pull effluent samples and worry until results are back. The process control tests give them confidence that the plant is operating in compliance.
- Facility has purchased their own equipment so that operators can do process control testing and make adjustments based on results.

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Results

Effluent June 2016

Effluent September 2016

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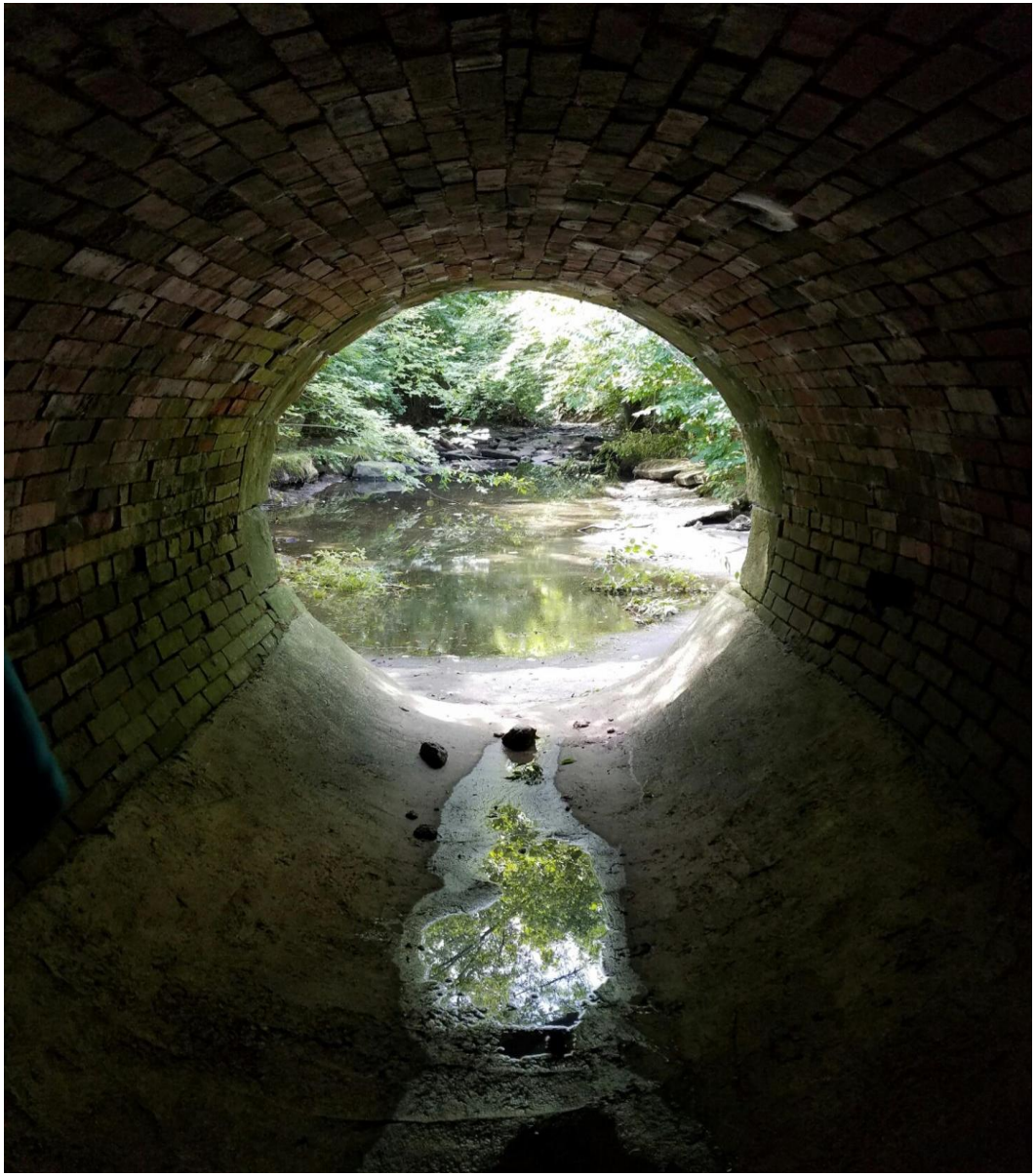

Questions

Ohio Environmental Protection Agency

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