



OTCO 2020 WORKSHOP / WEBINAR TRAINING
VIRTUAL WORKSHOP
OCTOBER 27, 2020

TOOLS FOR ASSESSING FACILITY RISKS

Facility Asset Condition Assessment
Security Risk and Resilience Assessment

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Levels of Risk



Strategic	Risk and Resilience Assessment (Malevolent Acts, Natural Hazards, Regional Issues, Accidental Contamination)
Operational	
Asset	
	Asset Condition Assessment



OTCO 2020 WORKSHOP / WEBINAR TRAINING
STRASBURG WORKSHOP
AUGUST 13, 2020

Part 1: FACILITY ASSET CONDITION ASSESSMENT

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Presentation Outline

- **WHY**
Why does your utility need a condition assessment framework?
- **HOW**
How do you conduct a condition assessment and score assets?
- **WHEN**
How frequently should you assess condition?
- **WHAT**
What do you do with the data?

WHY

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Ohio Administrative Code 3745-87-03

In order to demonstrate adequate technical capacity, **every public water system's** asset management program shall include the following:

- Evaluation of assets, including the following:
 - **Condition (e.g. excellent, good, fair, poor, needs replacement)**
 - History of maintenance and repair
 - Estimated remaining useful life based upon condition and performance
 - A prioritization of assets based on criticality and condition assessment

Why does my utility need a condition assessment **framework**?

- It helps with Capital Planning
 - Facility master plans
 - Replacement plans
 - Long-term financial forecasting
- Maintenance Planning (on-condition maintenance)
 - >80% of Preventive Maintenance is calendar-based*
 - 30-40% of Preventive Maintenance has no impact on failure frequency*
 - 50% of failures are induced by break-in maintenance
- Objectivity
- Repeatability

*Deryk Anderson, Business Analyst – Maintenance, Oniqua Enterprise Analytics (Sydney, AUS)

HOW

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Pros and Cons of Ohio EPA's Guidance on 1-5 Scoring

PROS

- More objectivity and repeatability than informal CA
- Allows for the utility to see broader picture

CONS

- Too simplified - not specific indication of what is wrong with an asset based on the score (How do you determine what the mitigation actions are?)

Why is this a 5? What to do?



Why is this a 5? What to do?



Pros and Cons of Ohio EPA's Guidance on 1-5 Scoring

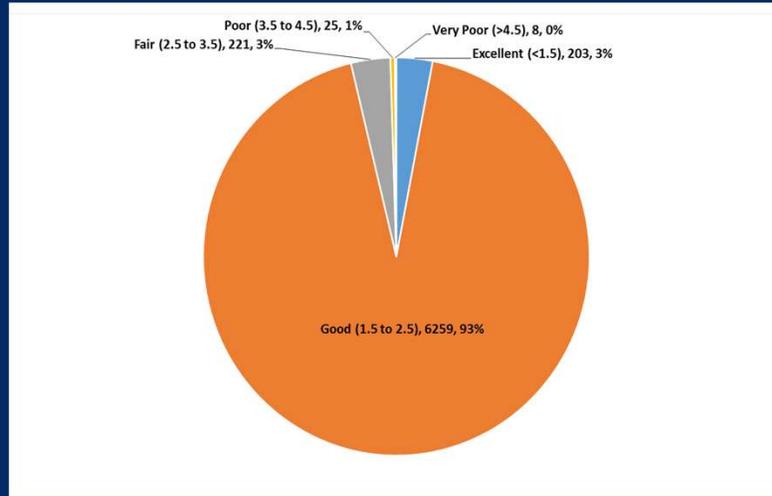
PROS

- More objectivity and repeatability than informal CA
- Allows for the utility to see broader picture

CONS

- Too simplified - not specific indication of what is wrong with an asset based on the score (How do you determine what the mitigation actions are?)
- Leads to inconsistent decision making
- And...

The first time I ever...



Customized Facilities Condition Assessment

- Improve granularity
- Improve objectivity and repeatability
- Better guides subsequent action

THE RESULT:

- **Multiple Assessments:** Different questions for different asset types (Structural, Electrical, Mechanical, HVAC, Valves/Gates, Tanks)
- Multiple questions

Columbus Maintenance Staff Input

CA Sub Group	Assessment Criteria	Weight	CA Sub Group	Assessments	Condition Evaluation
STR1	Structural Damage	40%	STR1.1	Concrete	Cracking (width of crack)
					Exposed Reinforcement
			STR1.2	Steel	Spalling, Exposed Aggregate, Pitting, Freeze/Thaw
					Joint Damage
STR2	Foundation Settling	30%		Magnitude of settling	Structural Corrosion - Loss of Section
					Cracking
STR3	Structural Appurtenances	20%		Railing, Walkways, Platforms, Stairs and Ladders	Fatigue/Connection Failure
					Deformation
					Surface corrosion
					Structural Corrosion - Loss of Section
STR4	Doors / Hatches	10%		Access doors and hatches	Cracking
					Fatigue/Connection Failure
					Deformation
					Surface corrosion

CA Tool - Simplified

Assessment Criteria	Weight	Assessments	Condition Evaluation
Corrosion / Leakage	50%	Corrosion Equipment Leakage	Surface Corrosion / Coating Damage
			Structural Corrosion / Damage
			Leakage (not piping and valves)
Vibration / Noise / Heat	50%	Includes equipment, drive and motor	Noise with no Apparent Vibration
			Vibration (no No Structural Damage)
			Vibration with Structural Damage
			Heat Generation / Running Hot

Scoring Framework

Condition Evaluation	1 - Excellent	2 - Good	3 - Fair	4 - Poor	5 - Very Poor
Surface Corrosion / Coating Damage	None	<=10%	10%-25%	>25%-50%	>50%
Structural Corrosion / Damage	None		1 location - minor	1 location major (hole)	>1 location major (holes)
Leakage (not piping and valves)	None		Drip only	Stream 1 loc	Stream >1 loc
Noise with no Apparent Vibration	None		Minor	Moderate	Major
Vibration (no No Structural Damage)	None			Minor	Major
Vibration with Structural Damage	None				Yes
Heat Generation / Running Hot	None			Moderate	High

Demo

Condition Assessment

Date of Condition Assessment *
Friday, July 06, 2018

What is your Location? *
Please set the location on the rooftop of the building.

No Location

Press to capture location using a map

Client Information

Client Name *

Facility Name *

Asset Information

Equipment Type? *
 Non-HVAC HVAC

What asset are you assessing? *

What is the asset ID? *

CA Tool – Scoring an Asset

Assessment Criteria	Weight	Assessments	Condition Evaluation
Corrosion / Leakage	50%	Corrosion Equipment Leakage	Surface Corrosion / Coating Damage
			Structural Corrosion / Damage
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The Advantages of Granularity

Assessment Criteria	Weight	Assessments	Condition Evaluation
Corrosion / Leakage	50%	Corrosion Equipment Leakage	Surface Corrosion / Coating Damage
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WHEN

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Condition Assessment – How Frequently to Assess

- No right or wrong answer, but...
- **NOT** weekly or monthly
 - The purpose is planning, not to determine when to do routine maintenance
- Start with annual as a baseline
 - Planning happens annually – do ahead of budgeting
 - Increase frequency for most critical / risky assets
 - Don't spend more on Cond. Assess. than your risk exposure
 - Perform on demand if operators suspect issues or maintenance frequency increases

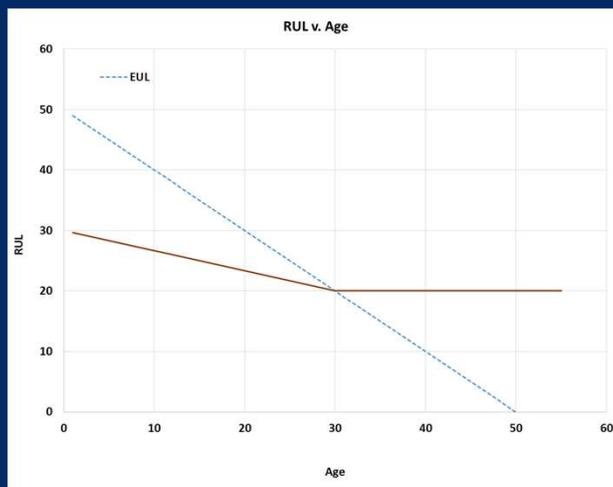
WHAT

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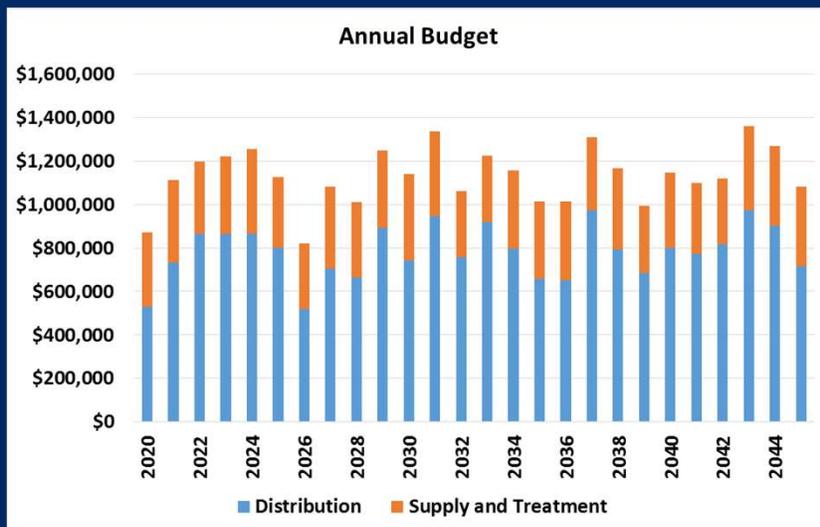
Ohio EPA Guidance – Expected Useful Life of Assets

Asset	Life Expectancy (years)
Backflow Prevention	35-40
Blow-off Valves	35-40
Buildings	30-60
Chlorination Equipment	10-15
Computers	5
Distribution Pipes	35-40
Electrical Systems	7-10
Hydrants	40-60
Lab/Monitoring Equipment	5-7
Meters	10-15
Other Treatment Equipment	10-15
Pressure Tank	7-10
Pumps	10-15
Service Lines	30-50
Storage Tanks	30-60
Transportation Equipment	10
Valves	35-40
Wells	25-35

Determining RUL based on Age, EUL, and Condition (3)



Facilities Replacement Plan



Part 1: Questions and Comments
(enter into the chat)

THANK YOU!

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Part 2: SECURITY RISK AND RESILIENCE Facility Assessment for Security Tool (FAST)

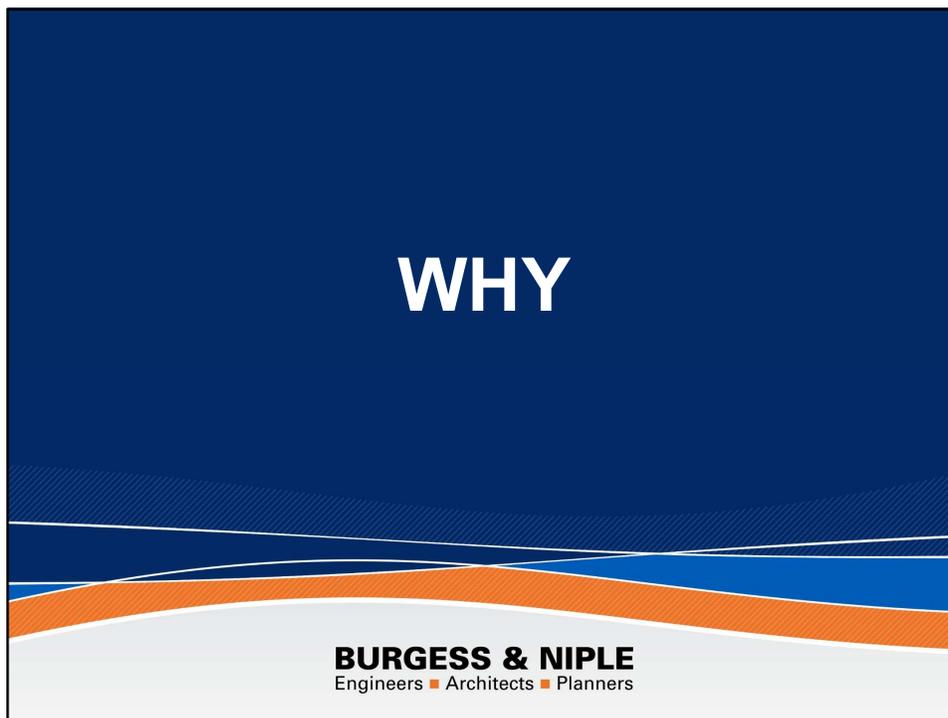
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Polling Question 2

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- ## Presentation Outline
- **WHY**
Why does your utility need to assess security?
 - **WHEN**
When and how often must security be assessed?
 - **HOW**
How can security measures be efficiently assessed?
 - **WHAT**
What do you do with the data?



America's Water Infrastructure Act (AWIA)

AWIA 2018 requires drinking water utilities to:

- Perform a Risk and Resilience Assessment
- Update its Emergency Response Plan

Population Served	Risk & Resilience Assessment	Emergency Response Plan*
≥100,000	March 31, 2020	September 30, 2020
50,000-99,999	December 31, 2020	June 30, 2021
3,301-49,999	June 30, 2021	December 30, 2021

Water and Wastewater Utility Resiliency



Baseline Information on Malevolent Acts for Community Water Systems

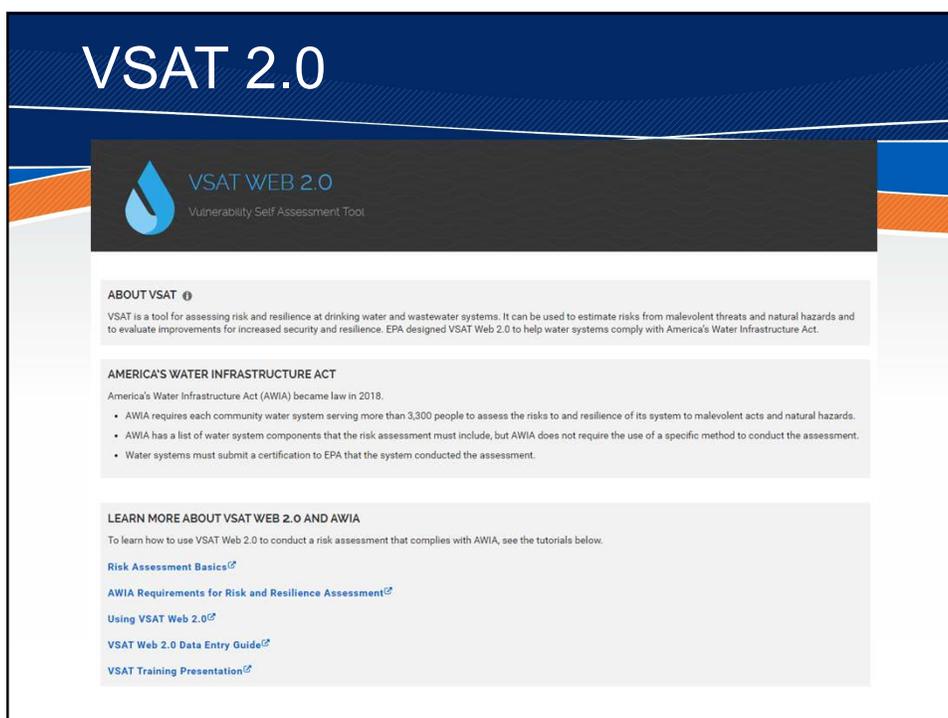
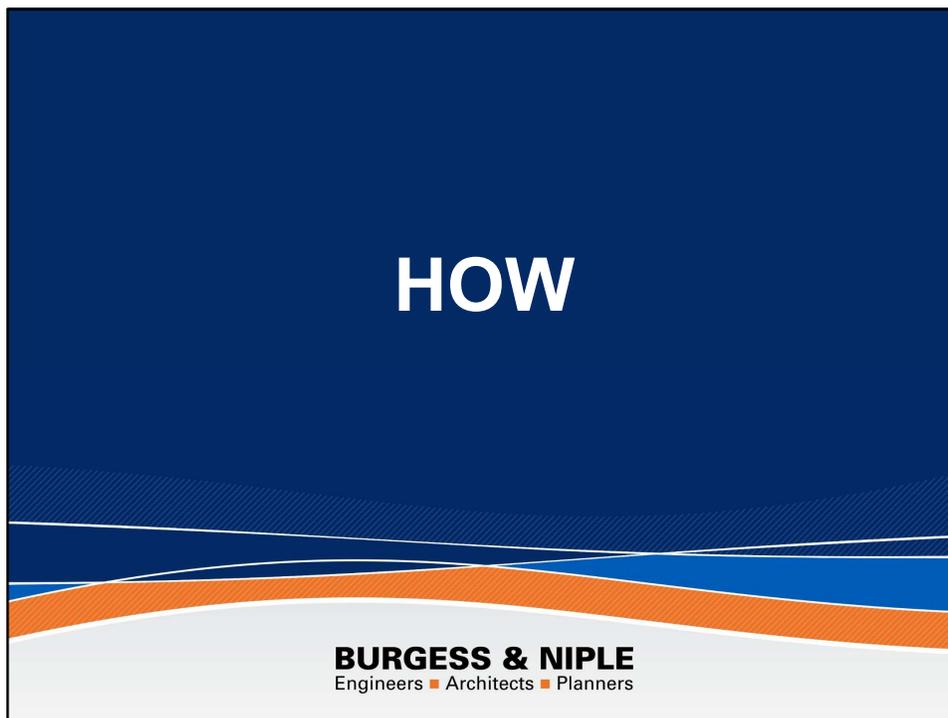
Table 6: Threat Category: Assault on Utility – Physical

Threat Category Definition: A physical assault on utility infrastructure or staff with the intent of disabling infrastructure and/or terrorizing staff

Crosslink to AWWA J100-10 Standard Reference Threat Scenarios	Annual Default Threat Likelihood	
	Water	Wastewater
<ul style="list-style-type: none"> • Aircraft: (A1) Helicopter, (A2) Small Plane, (A3) Regional Jet, (A4) Large Jet • Assault Team: (AT1) 1 Assailant; (AT2) 2-4 Assailants, (AT3) 5-8 Assailants; (AT4) 9-16 Assailants • Maritime: (M1) Small Boat, (M2) Fast Boat, (M3) Barge, (M4) Deep Draft Ship • Vehicle Borne Bomb: (V1) Car, (V2) Van, (V3) Midsize Truck, (V4) Large Truck • Directed: (AS) Active Shooter • Contamination of Product: C(E) Explosive 	10 ⁻⁶	10 ⁻⁶
	<p>Basis:</p> <ul style="list-style-type: none"> • Estimate 100,000 potential water utility targets in the United States. • While this type of attack is possible, it has never been reported for a U.S. water utility. • Available intelligence (public) provides no basis to elevate this likelihood currently. • Conservative estimate of threat likelihood: One attack per 10 years among 100,000 water utilities. 	

AWIA Focal Points

- Malevolent Acts
 - Physical Assault on the Utility
 - Contamination of Finished Water (Intentional/Accidental)
 - Theft or Diversion (Physical/Financial)
 - Physical Sabotage
 - Contamination of Source Water (Intentional/Accidental)
 - **Cybersecurity**
- Natural Disasters
 - Covered by Ohio Administrative Code Requirements for Contingency Plans



Standards

Draft American National Standard for Trial Use

Guidelines for the Physical Security of Water Utilities

December 2006



American Society of Civil Engineers



American Water Works Association



The Authoritative Resource on Safe Water®
Protecting, Preserving, and Improving Our Global Water Environment

ANSI/ASME-ITI/AWWA 2.00-10
(First Edition)





Risk Analysis and Management for Critical Asset Protection (RAMCAP®) Standard for Risk and Resilience Management of Water and Wastewater Systems

Using the ASME-ITI RAMCAP Plus® Methodology



Effective date: July 1, 2010.
 Approved by ASME-ITI Management Committee: January 15, 2010.
 Approved by AWWA Board of Directors: January 17, 2010.
 Approved by American National Standards Institute: May 4, 2010.

Lions and Tigers and Bears...

TABLE 2-1
Benchmark Security Measures for Raw Water Facilities

Security Measure	System Objective ^a		Vandals		Criminals		Saboteurs		Insiders		Applicable Sections in Appendix A, Physical Security Elements
	Delay	Detection	Base Level	Enhanced Level							
	Perimeter (reservoir impoundments, intake structures, raw water pumping stations, open channels)										
Basic perimeter fencing or perimeter walls	●		✓								1.0, 1.1, 8.1
Enhanced climb/cut-resistant fencing or walls	●			✓	✓	✓	✓	✓			1.2, 1.4, 1.5
Foundation enhancements for fencing to prevent tunneling	●						✓	✓			1.7
Bollards or vehicle barriers limiting vehicle access	●							✓			5.0
Intrusion detection at perimeter		●		✓		✓	✓	✓			1.6, 3.0, 7.0, 9.1, 9.2, 11.0
Key-locked entrance gate	●		✓		✓		✓		✓		2.1, 10.2
Entrance gate controlled by using access control system	●	●		✓		✓		✓		✓	2.2, 2.3, 10.3, 10.4, 10.5
Intercom and remotely controlled electronic gate lock for visitors	●	●		✓		✓		✓		✓	2.2, 2.3
Guardhouse and manned entrance gate to control site access	●	●						✓			
Perimeter site lighting		●	✓	✓	✓	✓	✓	✓			7.0
Gate entrance lighting		●		✓		✓	✓	✓			7.0 (4), (5), (6)

Simple Approach to Start

Facility Criticality	Minimum Security Measures
5	Insider, Vandalism, Criminal, Saboteur
4	Insider, Vandalism, Criminal, Saboteur
3	Insider, Vandalism, Criminal
2	Insider, Vandalism
1	N/A

Polling Question 3
(followed by a tool
demo)

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Facility Assessment for Security Tool (FAST)

Demo

Survey123 for ArcGIS

City of Phoenix Security Master Plan Site Inspection

Inspection Date *
Friday, August 7, 2020

What is the facility Location? *

40°1'N 82°52'W

Client and Site Information:

Client Name:
Phoenix WSD

Site Count:

Asset Count:

WSD ID (Site Identifier):

Site Name:

WHEN

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America's Water Infrastructure Act (AWIA)

Every 5 yrs., AWIA requires drinking water utilities to:

- Update the Risk and Resilience Assessment
- Update the Emergency Response Plan

Population Served	Risk & Resilience Assessment	Emergency Response Plan*
≥100,000	March 31, 2020	September 30, 2020
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WHAT

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What to do with RRA data?

- Capital Projects
 - Construct additional security barriers
 - Existing security measure is missing
 - Existing security measure is failing
 - Existing security measure is obsolete
 - Update the Utility Emergency Response Plan / Contingency Plan
 - Add cybersecurity if not included already

Questions and Comments

THANK YOU!

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