



Smart Management for
Small Water Systems



Webinar 1 for Small Systems in Connecticut: Asset Management for Small Systems: Improving Your System While Meeting Regulations

Presented By: Heather Himmelberger

www.southwestefc.unm.edu

www.efcnetwork.org



This program is made possible under a cooperative agreement with the U.S. EPA.

The New CT Requirements: The Story Behind the Regulations



STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH



Raul Pino, M.D., M.P.H.
Commissioner

Dannel P. Malloy
Governor
Nancy Wyman
Lt. Governor

Drinking Water Section

DWS Circular Letter 2018-21

TO: Community Public Water Systems

FROM: Lori Mathieu, Public Health Section Chief, Drinking Water Section *Lori Mathieu*

DATE: July 20, 2018

SUBJECT: Public Act 18-168 – New Asset and Fiscal Management Plan Requirements, Hydropneumatic Tank Requirement, Civil Penalties Revision

The Department would like to make you aware of sections contained in Public Act 18-168, that passed during the last legislative session, which will have upcoming requirements for community public water systems. The following information highlights the key elements contained within the pertinent sections:

- 1) **Section 61 - Asset and Fiscal Management**
 - **Not later than January 1, 2021**, each small community water systems (which regularly serves at least 25, but not more than 1,000, year round residents) shall prepare a fiscal and asset management plan of all of the system's capital assets, to be updated annually;
 - **Not later than May 2, 2019**, each small community water systems shall complete, on a form developed by the Department, a fiscal and asset management plan assessment review of its **hydropneumatic pressure tanks**. The form will be made available this Fall.
- 2) **Section 61 does not apply** to small community water systems regulated by the Public Utilities Regulatory Authority (PURA), subject to CGS § 25-32d, or a state agency.
- 3) **Section 62 - Civil Penalties (Effective October 1, 2018)**
 - Subsections (a) to (e) of CGS §25-32e are repealed and substituted with the following (abbreviated):
 - If a water company has violated any provision of section 25-32, 25-32d or any regulation adopted under §25-32d, or any provision of title 19 or 25 or any regulation promulgated pursuant to these titles that relate to purity and adequacy of water supplies, the Commissioner:
 - (1) can impose a civil penalty not to exceed \$5,000/day;

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Hartford, Connecticut 06134-0308
www.ct.gov/dph/publicdrinkingwater
Affirmative Action/Equal Opportunity Employer





**For most of you,
drinking water
service is not
your main
activity, but
rather is a small
part of what you
do.**



**Because of
that, water can
fade into the
background**



As long as the faucets are
running, water may
become something you
don't think about



But for many reasons, water needs to be a significant focus



Public Health

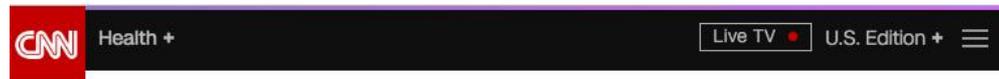


Water flowing from a faucet in a hospital in Flint, Mich., Sue Hendrickson and Pete Larson pose at the site where SUE was excavated.

The Flint Water Project

Toxic levels of lead

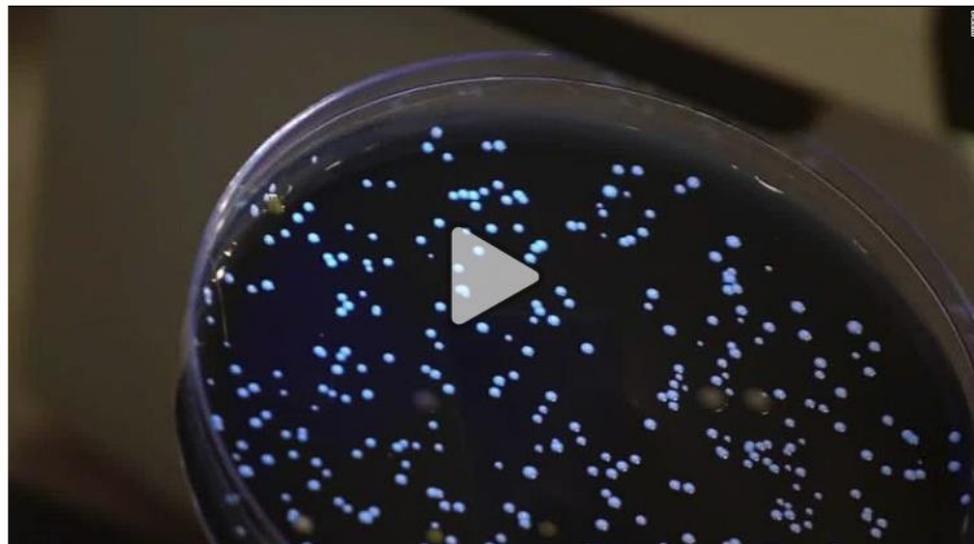
Trihalomethanes are just one group of chemicals associated with water contamination, lead is another. Lead was a popular choice for use as water pipes for centuries. The Romans used the dense metal because of its durability and malleability. Water pipes are no longer made from lead, but older cities, such as Flint, still rely on lead pipes—in addition to those made from copper and iron—to transport water to people's homes. No one knows exactly how many lead pipes are used in the United States, but the number is in the millions. In addition to the pipes themselves, lead is also found in alloys (mixtures of metals) in other parts of the plumbing system.



Drinking water blamed in hundreds of illnesses, 13 deaths, CDC reports

By Susan Scutti, CNN

Updated 4:55 PM ET, Thu November 9, 2017



What is Legionnaires' disease? 01:03

Story highlights

19 states reported 42 drinking-water-associated outbreaks in 2013-14

(CNN) — Clear water is not always a sign of clean water -- or so suggest [two new reports](#) on water-associated disease outbreaks published Thursday by the US Centers for Disease Control and



Regulatory Compliance

The New York Times

Here Are the Places That Struggle to Meet the Rules on Safe Drinking Water

By Brad Plumer and Nadja Popovich

Feb. 12, 2018

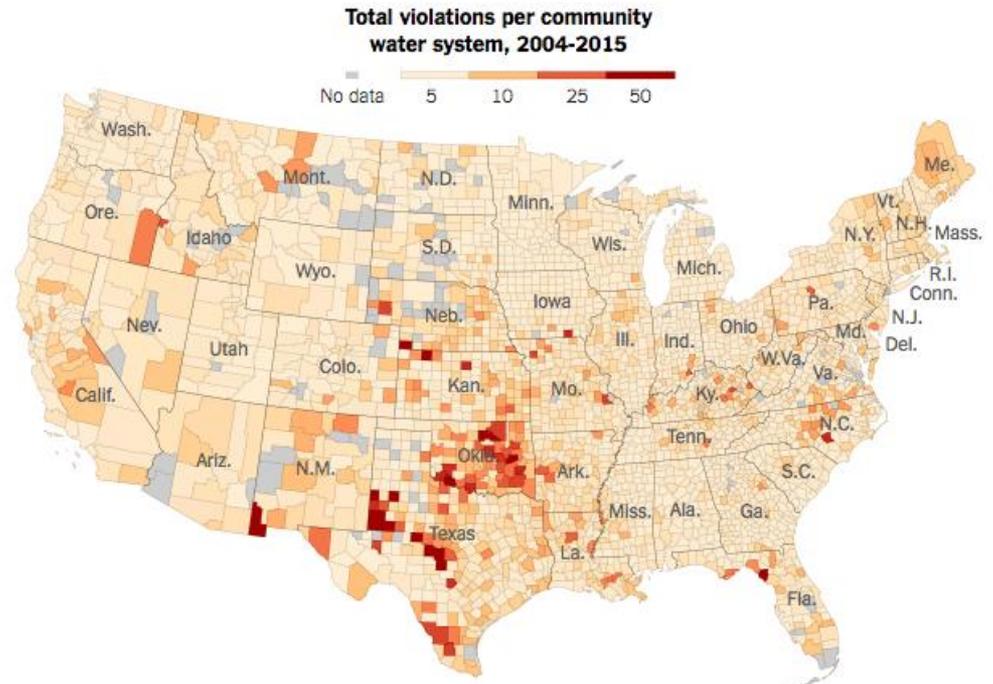


WASHINGTON — To ensure that tap water in the United States is safe to drink, the federal government has been steadily tightening the health standards for the nation's water supplies for decades. But over and over again, local water systems around the country have failed to meet these requirements.

In a [new study published in the Proceedings of the National Academy of Sciences](#), researchers found that, since 1982, between 3 and 10 percent of the country's water systems have been in violation of federal Safe Drinking Water Act health standards each year. In 2015 alone, as many as 21 million Americans may have been exposed to

Struggling to Meet New Water Quality Standards

Some rural water systems, especially in Texas and Oklahoma, have had many violations as new rules have gone into effect over the past decade.





Public and Employee Safety



New London could lose water supply for days after main break

Staff and The Associated Press Published 9:32 am EDT, Thursday, August 14, 2014



**Reliability
of Service**



Resiliency: Emergencies

Power Outages across Connecticut

By: Jesse Gosselin 

Updated: Jun 23, 2015 04:42 PM EDT





Resiliency: Financial





It is extremely important to run the water utility “like a business”

RUN LIKE A BUSINESS

It will help address all the concerns we just discussed and meet the new regulations



What does this entail?



What Assets Do You
Have?
What Do You Need To
Know About Them?



What Do You Want
Your Assets to Do In
Order To Provide
Your Customers
What They Want?



When You Get an
Emergency Phone Call,
What Asset Are You Hoping
They Don't Say? Please Tell
Me It's Not _____.



What Do You Do on a Day
to Day Basis to Your Assets
to Keep Them in Operation
as Long as Possible?



How Do You Decide When and How to Replace Assets?



Do You Have Enough
Money to Address All of
Your Operation and
Maintenance Needs?



Are You Investing Enough
in Asset Replacement?
How Would You Know?



What Are Talking About is Called Asset Management

What assets do you have?



Which ones are most important to doing that?



Do you have the money to get it done?



What do you want them to do?

How do you ensure you can do what you want to do all the time?



It's actually a circle rather than a line





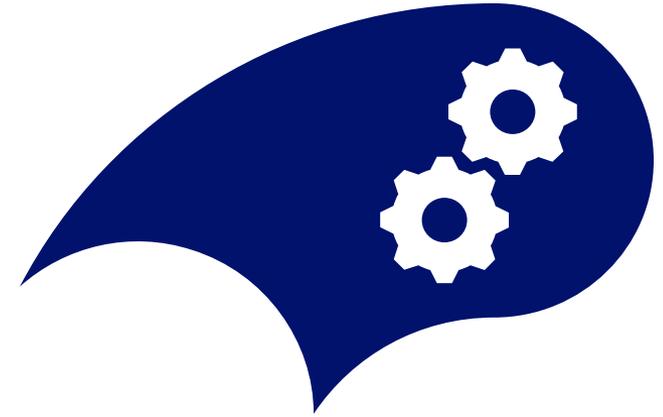
It can start from wherever you are



The main thing
is to just do it.



**DIGGING
DEEPER**



Asset Inventories and Maps

Core Component 1



What
assets do
you own?





So, what do
we want to
know about
the assets?





Information Needed

- Current Condition of each asset
- Useful life of each asset
- Maintenance and Service History
- Manufacturer's recommendation
- Plan to recondition, refurbish or replace assets
- Location of assets (building or map)
- Asset ID
- Attributes (Age, Manufacturer, size, type, material, serial #, model #, HP, etc.)
- Replacement cost
- Operational Status



Covered a little later

Useful Life Estimates

How much longer will the asset last in service given it's current condition, maintenance history, and everything you know about other assets of this type. Age is NOT the best indicator of how much longer something will last



A Word About Asset ID Numbers





The Importance of Pictures

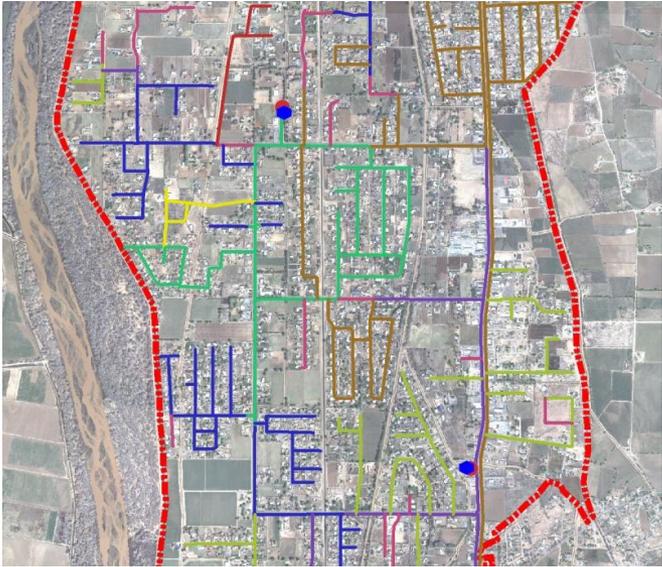


APRIL Plus⁺ INVERTER DUTY NEMA Premium

HP	HP	B.F.W.	TORQUE(LB-FT)	VOLTS	AMPS
1.5	0.2015	88-1800	0.838-16.0	480	6.12
2.0	0.55	178-1800	15.0	480	6.12
3.0	5	1800-3600	15.0 / 50	480	6.12
CHM PH	WT	RT	Y	X	X
	1.28	RT	1.4	1.2	1.8
INVERTER TYPE: SVPWM			CPWM	ROTOR WK: 0.422 FS	
TYPE: AEHh6N			C.A. 000504		
OUTPUT	5 HP / 3.7 KW	FRAME	154T	IMPRV. COOL.	
H _z	60	POL	4	INS	F
VOLTS	230/480	PHASE	3	ENCL	TEFC
AMPS	12.2/6.12	DESIGN	B	AMB.	40°C
RPM	1745	NEMA NOM EFF.	89.5	MIN. EFF.	87.5
	1:15	BEARINGS	6306ZZ	6306ZZ	
MODE	J	SERIAL NO.	JUL101009045004	WT	10.8 LBS

TECO - Westinghouse MOTORS (CANADA) INC.

MADE IN CHINA BY WATSON ELECTRIC



If you don't have a map, create one; Any kind can be helpful



Tools Available

Reference Guide for Asset Management Inventory and Risk Analysis

Inventory	
Necessary Data	Optional Data
<ul style="list-style-type: none">• Asset size - diameter and/or flow rate• Asset location• Installation date• Condition - Visible inspection, then update as needed with Maintenance history, age• Useful life (varies with type, if unknown an estimate is 50 years)	<ul style="list-style-type: none">• Model number• Supplier name & phone• Under warranty• Warranty expiration date• Manufacturer• Manufacturer's recommended O&M• Maintenance records: last date hydrant was flushed or exercised• Operational• Color (if useful)• Were design specifications followed?• Asset use

Provides you with information on what you may want to include in your inventory and where you can look for such data

<http://southwestefc.unm.edu/asset-management/>

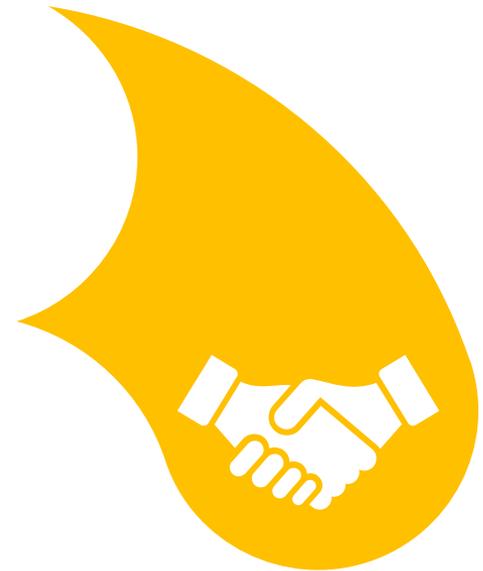


Tools Available

Inventory Spreadsheet

	A	B	C	D	E	F	G	H	I	J	K	L
1	System Name:											
2	Current Year	2018										
3												
4	ID Number	Asset Class or Category	Sub Asset Class or Sub Category	Asset Name	Type	Size	Length (if Pipe)	Operational Status (A = Active, I = Inactive, N = Non-Operational, S= standby/spare)	Manufacturer	Model Number	Serial Number	Supplier Name
5												
6												
7												
8												
9												
10												
11												
12												
13												

<http://southwestefc.unm.edu/asset-management/>



Level of Service

Core Component 2



Utilities are customer service businesses



So it's important to understand what the customers want and provide that to them



The best way to ensure the utility is meeting what the customers want is to ask them and then set goals to meet that level





GOAL: [✓]
GOAL: [✓]
GOAL: [✓]
GOAL: [✓]



Goals allow for the conversation of what happens when you don't meet the goal



Southwest
Environmental
Finance
Center

LEVEL OF SERVICE

Guidelines, Categories and Example Goals

Guidelines

The Level of Service Goals should define what your customers and employees can expect from the water utility. When customers understand what the utility is providing for them in terms of service and they are given a say in what the utility may provide in the future, they are more willing to pay. Customers need to understand that service is related to cost and typically the higher the level of service desired, the higher the costs associated with producing that level of service. Determining what the customer wants and is willing to pay for drives the decision making for the utility.

When defining your level of service goals, remember to write SMART goals – Specific, Measurable, Attainable, Realistic and Time Bound (when appropriate). This will allow the utility to track its performance, show successes and failures and revise for improvement each year. Goals can be changed or adjusted over time. Goals can also be added or removed from the list.

It's important to involve customers and staff in the process of establishing the goals or service levels. The goals can be either internal or external. External goals are those that directly impact the customers. Internal goals are those that are related to operations and that would not be easily understood by customers. Progress towards meeting the goals should be tracked and reported to upper management and the public.

Determining your Level of Service goals should not be overwhelming. Keep it simple; develop 10 – 12 goals around the most important aspects for your utility. The information below can be used as a resource in setting your utility's goals.

Categories

No matter where the water utility is located, customers desire roughly the same types of things from their utility – water that is safe and reliable, delivered at an adequate pressure, and that their concerns are addressed. Thankfully, this list is relatively small, allowing the utility to develop a targeted list of goals that address the major customer requirements. Level of Service Goals will typically fall into one of the following categories: Public Health and Safety, Customer Service, System Maintenance, Response Time, Water Loss

Tools Available

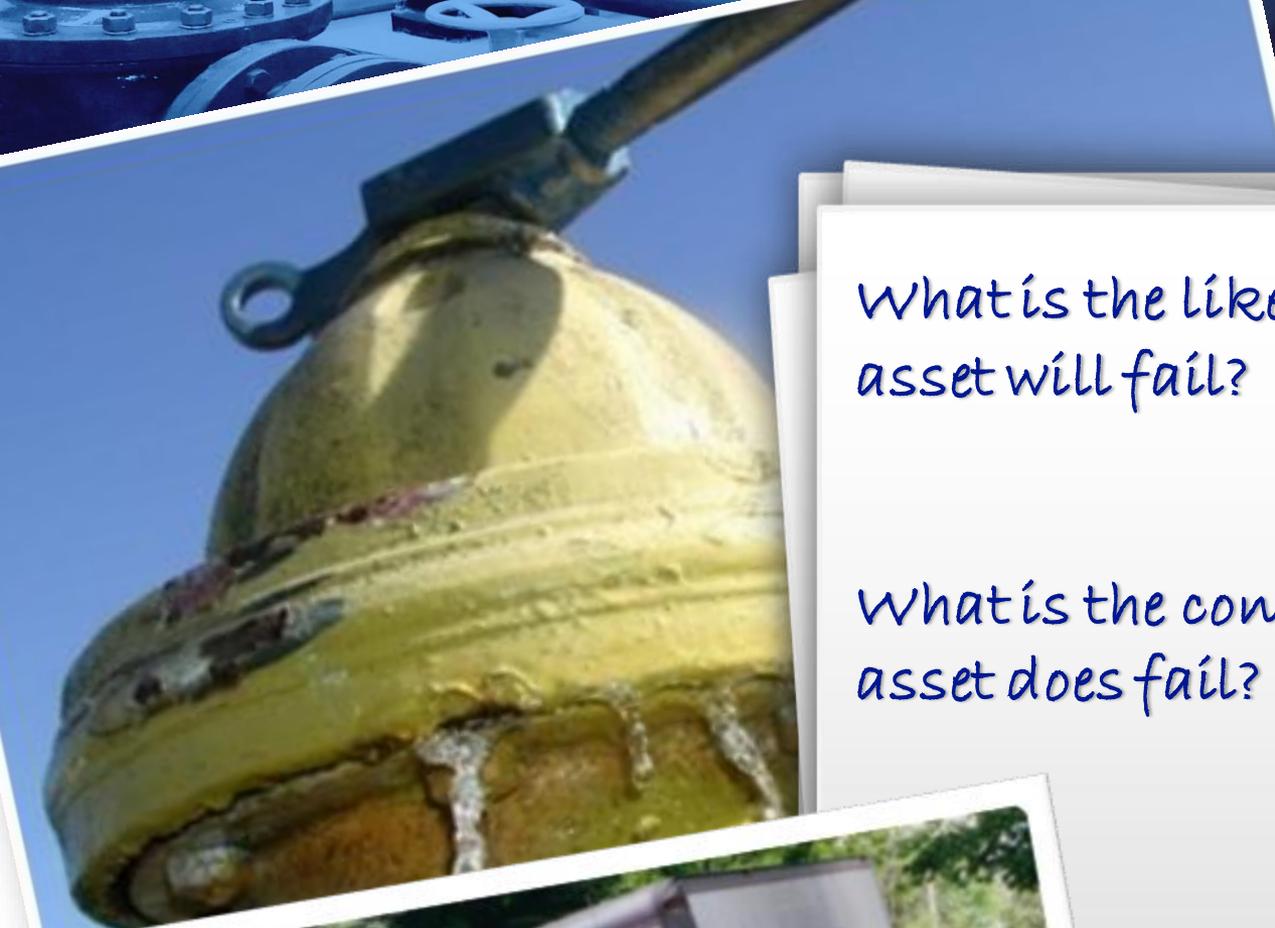
Level of Service: Guidelines, Categories, and Example Goals

<http://southwestefc.unm.edu/asset-management/>



Critical Assets

Core Component 3



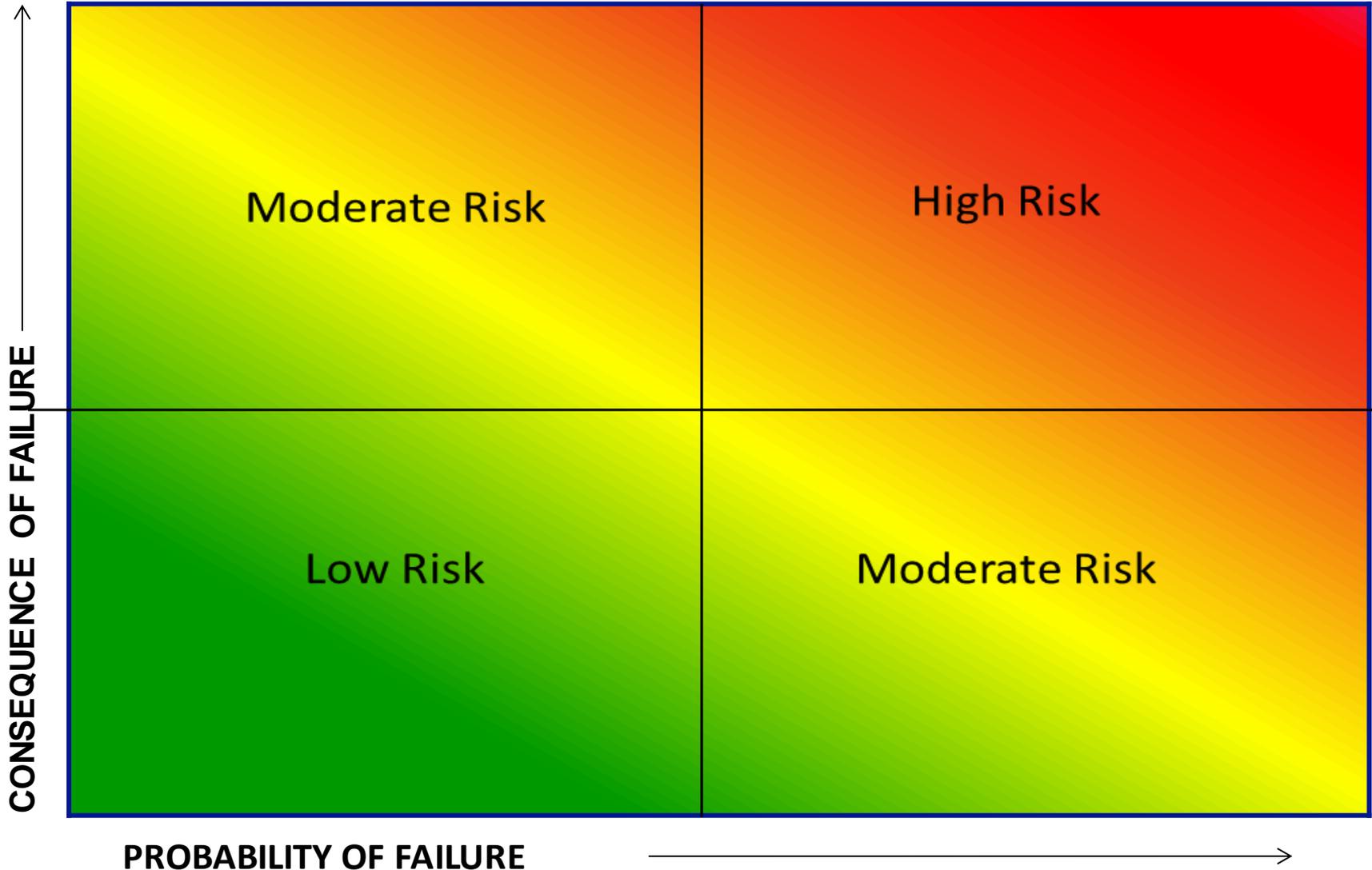
What is the likelihood that an asset will fail?

What is the consequence if the asset does fail?





ASSET RISK





Rank POF from 1 to 5

1

- EXTREMELY LOW PROBABILITY OF FAILURE

2

- REASONABLY LOW PROBABILITY OF FAILURE

3

- AVERAGE PROBABILITY THAT ASSET WILL FAIL

4

- HIGH LIKELIHOOD THAT THE ASSET WILL FAIL

5

- EXTREMELY HIGH LIKELIHOOD THAT THE ASSET WILL FAIL



Rank COF from 1 to 5

1

- EXTREMELY LOW CONSEQUENCES IF ASSET FAILS

2

- REASONABLY LOW CONSEQUENCES IF ASSET FAILS

3

- AVERAGE CONSEQUENCES IF ASSET FAILS

4

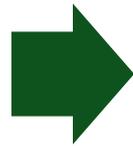
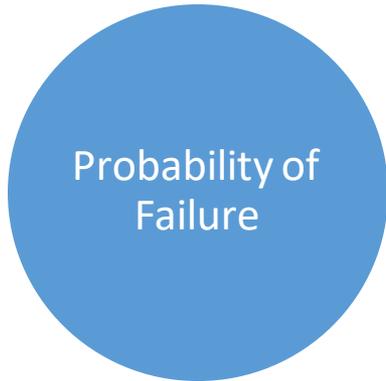
- HIGH CONSEQUENCES IF THE ASSET FAILS

5

- EXTREMELY HIGH CONSEQUENCES IF ASSET FAILS

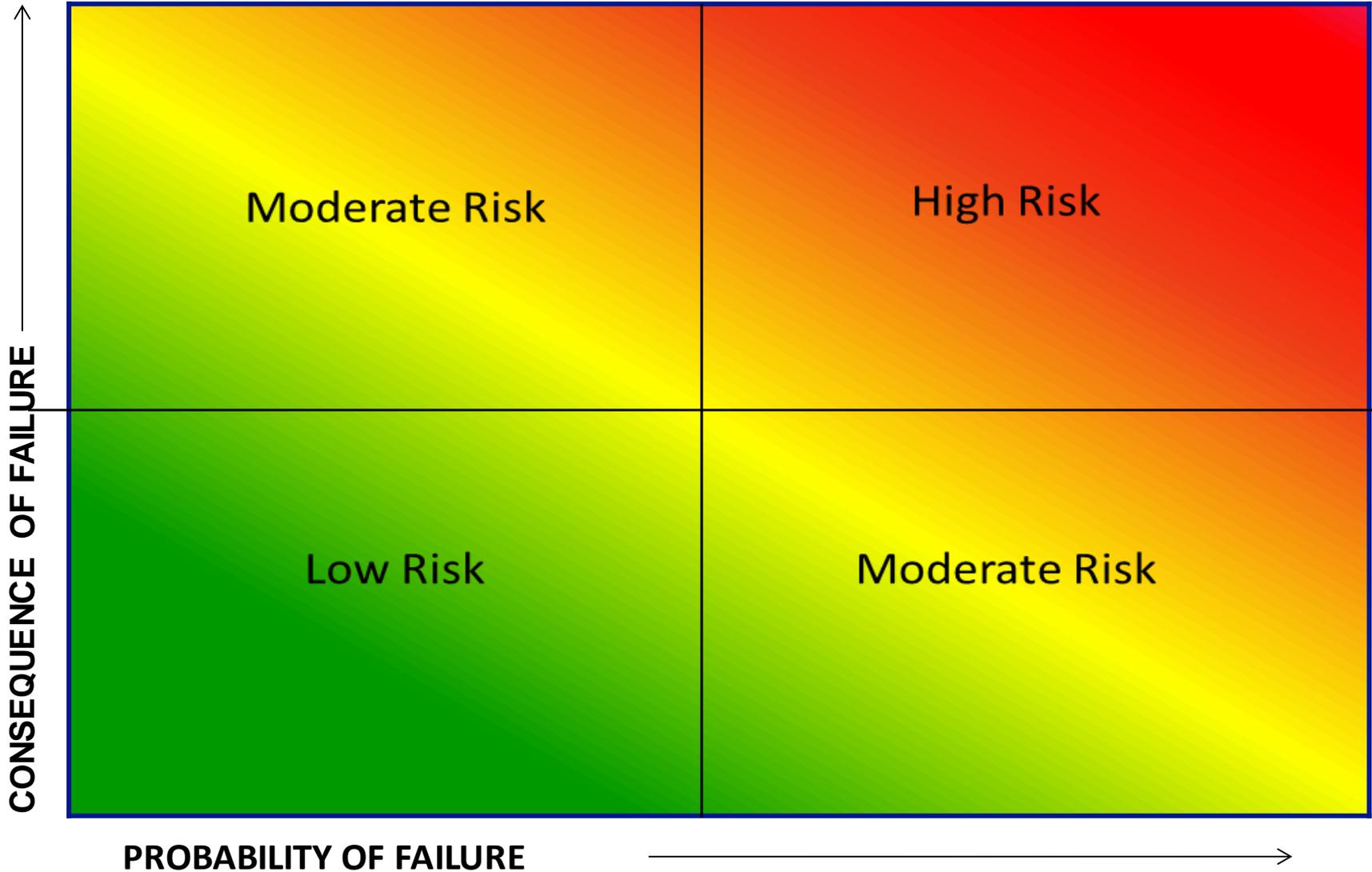


Calculating Criticality





ASSET RISK





Tools Available

Reference Guide for Asset Management Inventory and Risk Analysis

Risk - Hydrants (Fire, Flush, Flow Test)	
Probability of Failure <ul style="list-style-type: none">• Age• Condition - rusting, corrosion, leaking seal?• Frequency of Use - is it opened at least annually as part of a flushing or testing program?• Routine maintenance completed?• Pipe size connected to - less than 6 inch may cavitate• Tools needed to open readily available to fire department and water department?	Consequence of Failure <ul style="list-style-type: none">• Inability to fight a fire - loss of property, loss of life• Inability to properly flush system - health concerns• Water damage to nearby structures• Level of Service Failures

Provides you with lists of characteristics to take into consideration when determining Probability and Consequence of Failure

<http://southwestefc.unm.edu/asset-management/>

Tools Available

Criticality of Assets

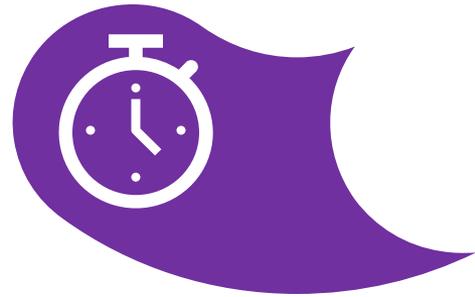
Allows you to calculate risk for assets

Asset: _____

Date: _____

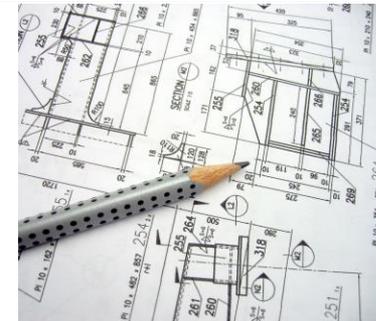
Consequence (Cost) of Failure	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
Multiplied		1	2	3	4	5
	Probability of Failure					
1	2	3	4	5		
1 Very Low	2 Low	3 Moderate	4 High	5 Very High		

<http://southwestefc.unm.edu/asset-management/>



Life Cycle Costing

Core Component 3



DESIGN



CONSTRUCTION



OPERATION



MAINTENANCE



Repairs



Rehab



Replace

LIFE CYCLE COSTING: CONSIDER THE ENTIRE LIFE OF THE ASSET



After design and construction, the assets enter the operational phase



Operation: Turning Equipment on and off, opening and closing valves, etc.

Maintenance:

Routine: Regular activities

Preventative: Trying to stop a bad situation from getting worse

Predictive: Trying to estimate when something might happen



If someone
maintained an
airplane the way you
maintain your
facility would you fly
in it?



If the answer is no,
it's a good sign that
you need to make
improvements



Five Questions to Ask Yourself:

What maintenance
Activities Do You
Do?

When Do You Do
Them?

How Do You Do
Them?

What Do They
Cost?

What Impact Do
They Have?



What maintenance Activities Do You Do?

When Do You Do Them?

How Do You Do Them?

What Do They Cost?

What Impact Do They Have?

Where might you go to get help on what maintenance to do?



Manufacturer's Information

United States Environmental Protection Agency

Preventive Maintenance for Small Public Water Systems Using Ground Water

An Interactive PDF with Suggested Preventive Maintenance Tasks and Logs

Introduction, System Information, Reference, and Contacts




Data and experiences from past activities

<https://www.epa.gov/dwcapacity/resources-small-public-water-system-operators>

United States
Environmental Protection Agency

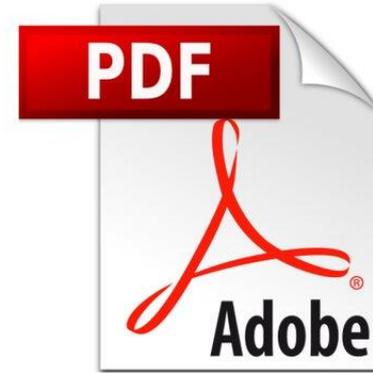
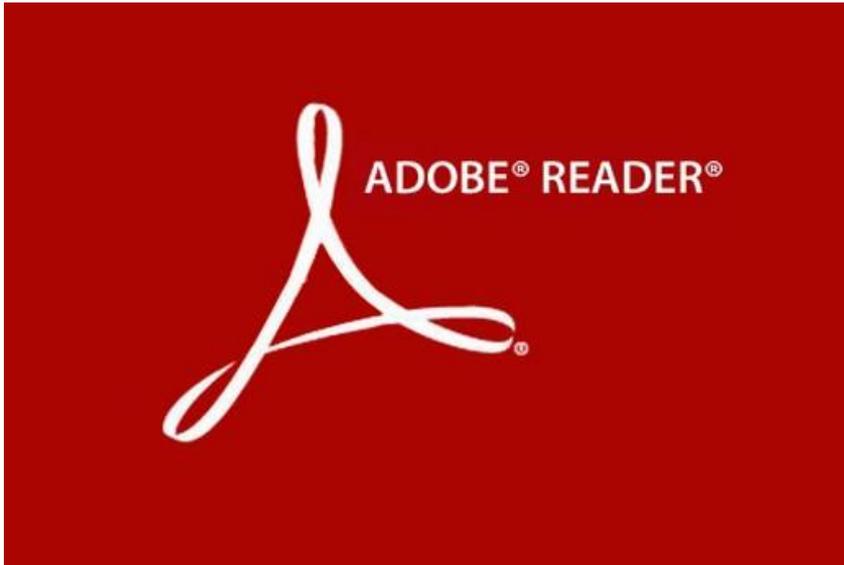
Preventive Maintenance for Small Public Water Systems Using Ground Water

An Interactive PDF with Suggested Preventive Maintenance Tasks and Logs

January O&M Task Lists & Logs



Software requirements:



Do not use Apple Preview



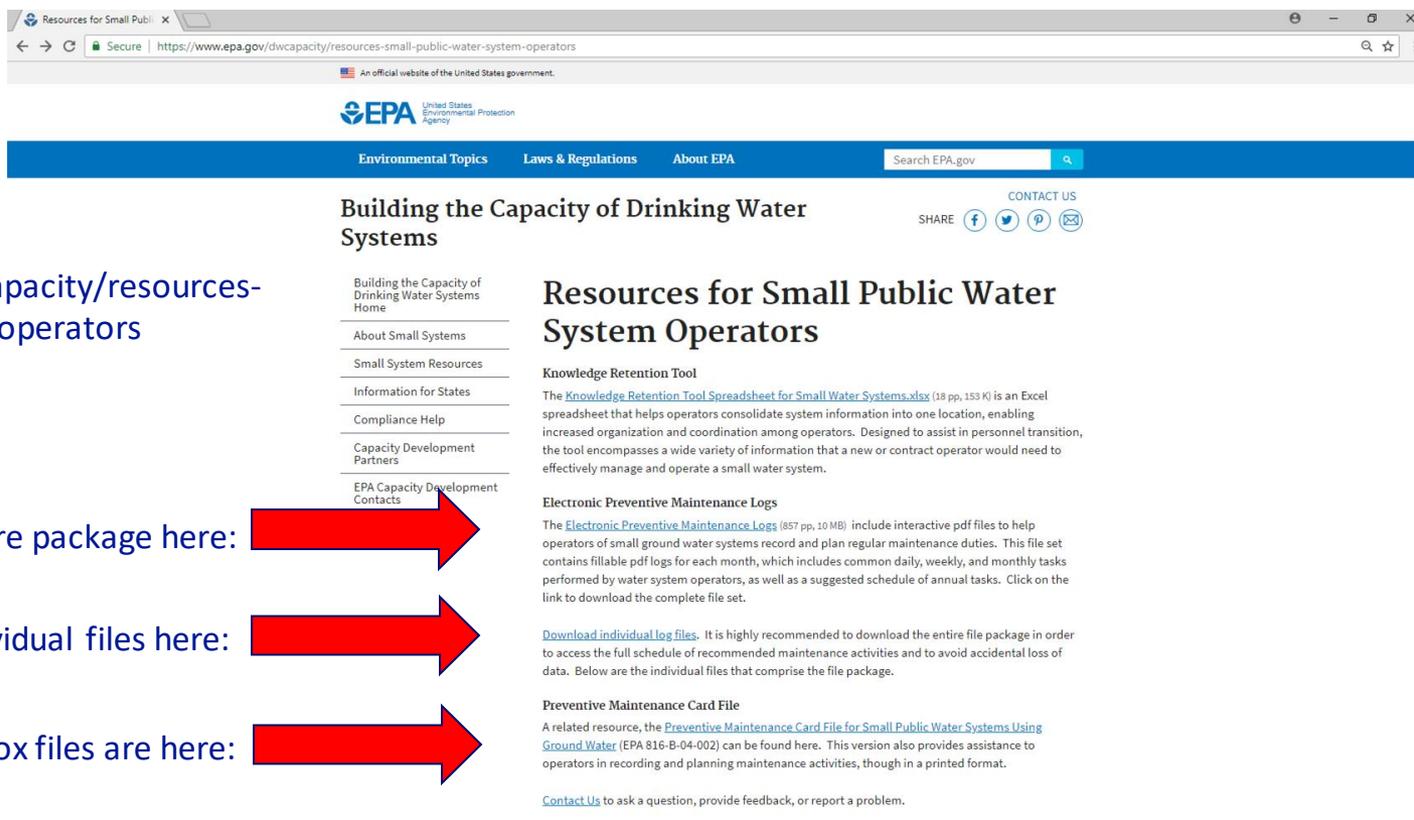
Where to get it:

<https://www.epa.gov/dwcapacity/resources-small-public-water-system-operators>

Download entire package here: 

Download individual files here: 

The older Black Box files are here: 



The screenshot shows the EPA website page titled "Resources for Small Public Water System Operators". The page features a navigation bar with "Environmental Topics", "Laws & Regulations", and "About EPA". The main content area includes a sidebar with links like "Building the Capacity of Drinking Water Systems Home", "About Small Systems", and "Small System Resources". The main content area has a heading "Resources for Small Public Water System Operators" and several sections: "Knowledge Retention Tool", "Electronic Preventive Maintenance Logs", and "Preventive Maintenance Card File". Each section contains a brief description and a link to download files. A "Contact Us" link is also present at the bottom of the page.



The screenshot shows the footer of the EPA website. It features the EPA logo on the left. To the right, there are four columns of links: "Discover." (Accessibility, EPA Administrator, Budget & Performance), "Connect." (Data.gov, Inspector General, Jobs), "Ask." (Contact Us, Hotlines, FOIA Requests), and "Feedback" (Feedback Questions). The Windows taskbar is visible at the bottom of the page.



Remember the Information Required for the Assets Inventory

Required to Have

- Current Condition of each asset
- Useful life of each asset

- Maintenance and Service History
- Manufacturer's recommendation
- Plan to recondition, refurbish or replace assets

You will need to keep records for the maintenance and service history of the assets

Consider the manufacturer's recommendations for each asset



What About When Assets Fail? There are Several Options

Repair



Rehabilitate



Replace





**Need to create a plan
on how each asset will
be refurbished,
replaced or
reconditioned**



**Typically called
capital improvement
plan**



An Example

Asset	Year Needed	Number of Assets Needed in Year	Replacement Cost/asset	Total Replacement Cost
Borehole/Well casing/well screen	2017	2	\$800,000	\$1.6 million
Borehole/Well casing/well screen	2025	1	\$800,000	\$800,000
Well House Piping	2017	250 ft	\$80/LF	\$20,000



For simplicity: For long term CIP, can combine into 5 year periods

Assets Included	Years Needed	Number of Assets Needed in 5 Years	Total Replacement Cost
Borehole/Well casing/well screen, 2 miles of pipe, 10 hydrants, 3 master meters,....	2030 - 2035	20	\$1.6 million
5 miles of pipe, 20 hydrants, 2 ARVs, ...	2035 - 2040	200	\$800,000
Well House Piping, Storage tank,....	2040 - 2045	50	\$20,000



Long Term Funding

Developing an asset valuation for your system



Stay tuned for
future webinars

**DO YOU HAVE ENOUGH
MONEY TO RUN YOUR
UTILITY NOW AND
REPLACE ASSETS AS YOU
NEED TO?**



Wrap Up



Summary of Requirements Related to Asset Management

**State of Connecticut – Department of Public Health
Drinking Water State Revolving Fund (DWSRF)
Asset Management Plan Checklist**

Public Water System: _____ Town: _____ PWSID: _____
 PWS FM Contact Person: _____ Relationship to PWS: _____
 Address: _____ City: _____ State: _____ Zip: _____
 Email: _____ Phone: _____

A copy of the **Asset Management (AM) Plan** must be attached to this checklist. Should this form be used in conjunction with any SRF funding requirements, a signed request for review on utility letterhead must accompany this checklist.
It must have been updated within the past 3 years.

The AM Plan should contain, at a minimum, the following information: **EPA Guidance** (Click to Download)
(check off each item that is included in the Plan) [Reference Guide for Asset Management Tools](#)
[CUPSS](#)

1	Discussion of when plan was first created, how it gets updated, and date of most recent update	Strategic Planning STEP
2	List of all the drinking water supply assets of the public water system including the item, location, manufacturer, model, size (if applicable), and expected useful service life	Taking Stock STEP Asset Management STEP Asset Management Best Practices Guide
3	Description of the state of each asset, including age and condition, and any conditions that may affect the life of the asset	Taking Stock STEP Asset Management STEP
4	A description of the service history of each asset including routine maintenance, repairs and rehabilitations	Taking Stock STEP Asset Management STEP Distribution Systems Best Practices Guide
5	The adjusted useful service life and remaining useful service life of each asset	Taking Stock STEP Asset Management STEP
6	Description of the intended Level of Service to be provided to customers/consumers	Taking Stock STEP Asset Management STEP Asset Management Best Practices Guide Asset Management for Local Officials
7	Evaluation of the operation of the system, including available supply vs. demand	Strategic Planning STEP Distribution Systems Best Practices Guide Water System Operator Best Practices Guide
8	Identification of critical assets, including discussion of how they were determined	Asset Management STEP Taking Stock STEP
9	Ranking of each asset in terms of priority, taking into consideration the remaining useful service life, redundancy, and the importance of the asset to the operation of the water system and protection of public health	Asset Management STEP Taking Stock STEP
10	List of capital improvements needed over the next five years (i.e. Capital Improvement Plan), including expected costs for each improvement.	Asset Management STEP Taking Stock STEP Asset Management Best Practices Guide
11	Explanation of how decisions for water system maintenance and repairs are made	Water System Operator Best Practices Guide Distribution Systems Best Practices Guide
12	Description of the water system maintenance plan	Strategic Planning STEP Distribution Systems Best Practices Guide
13	Discussion of members of the Asset Management Team, including responsibilities with respect to oversight of the AM Plan, reviewing and updating	Strategic Planning STEP Building an Asset Management Team Water System Operator Best Practices Guide

This form and relevant attachments must be submitted to the Drinking Water Section for review and be approved in order for the PWS to be eligible to receive any grant-in-aid pursuant to Public Act 14-98.



Summary of Requirements Related to Asset Management

The AM Plan should contain, at a minimum, the following information:
(check off each item that is included in the Plan)

EPA Guidance (Click to Download)
[Reference Guide for Asset Management Tools CUPSS](#)

1	Discussion of when plan was first created, how it gets updated, and date of most recent update	Strategic Planning STEP
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Summary of Requirements Related to Asset Management

6	Description of the intended Level of Service to be provided to customers/consumers	Taking Stock STEP Asset Management STEP Asset Management Best Practices Guide Asset Management for Local Officials
7	Evaluation of the operation of the system, including available supply vs. demand	Strategic Planning STEP Distribution Systems Best Practices Guide Water System Operator Best Practices Guide
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Resources
are
available
to help



SOUTHWEST
ENVIRONMENTAL
FINANCE CENTER

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