Valve Exercising, Tools & Data Collection

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Valve Exercising, Tools & Data Collection

- Agenda
  - Why exercise a valve
  - Planning for an Exercise Program
  - What Counts as an Exercised Valve
  - Tools of an Exercise Program
  - Collecting The Data
  - Questions

Why exercise a valve

* Working Knowledge of Distribution System
* Asset Management
  - General Maintenance
  - Location of Assets
  - Emergency Use
    - Leaks, Breaks, Fires, Illegal Access containment

Why exercise a valve

In May 2007, The department of homeland security and EPA jointly published the

“Critical Infrastructure and Key Resources Sector-Specific Plan as input to the National Infrastructure Protection Plan”

Which specifically states to:

Identify Assets, Systems, Networks, and Functions

In other words,

“know where your assets are!”

Why exercise a valve

* Working Knowledge of Distribution System
* Asset Management
  - General Maintenance
  - Location of Assets
  - Emergency Use
    - Leaks, Breaks, Fires, Illegal Access containment
* Identify problems
  - Closed Valves
  - Non-working valves
  - Replace / Repair
* EPA REQUIREMENT

Ohio Environmental Protection Agency

Valve Exercising Program Guidance

Division of Drinking and Ground Waters

Per AWWA G200-15 Distribution Systems Operation and Management, section 4.2.5, a valve exercising program is to follow AWWA Manual M44 and the manufacturer's recommended procedure and include at least the following elements:

1) A goal for the number of transmission valves to be exercised annually based on the percentage of the total valves in the system.
2) A goal for the number of distribution valves to be exercised annually.
3) A goal that 100% of the valves are tested within a certain time frame (recommend 1x/5 years).
4) Measures to verify that the goals are met and written procedures for action if the goals are not attained.
5) Critical valves in the distribution system shall be identified for exercising on a regular basis. Potential water quality and isolation concerns shall be recognized. The program shall track the annual results and set goals to reduce the percent of inoperable valves.
6) The valve-exercising program may be implemented in conjunction with the systematic flushing program.
7) A goal of replacing the inoperable valves identified during the operation and maintenance process shall be established as part of the exercising program.

Determining which valves are critical

- Transmission mains affecting service to large groups of customers
- Distribution valves necessary to maintain service to critical customers such as: hospitals, dialysis centers, nursing homes, medical facilities, manufacturing facilities, downtown/high density areas, and service connections where loss of flow could impact human health due to catastrophic events (Waste water treatment plant critical processes or loss of cooling water to processes where it is critical)
- Areas prone to main breaks
- Areas of infrastructure approaching the end of its useful life
- Areas around road or other utility re-construction areas

Frequency of exercising

- Critical valves - annually
- Non-critical valves:
  - Rate of deterioration known to occur in the distribution system.
    Systems should operate a representative sample annually to determine rate of deterioration
  - Consequence of failure or delays in being able to close the valve

September 7, 2018

September 7, 2018

*EPA

Valve Exercising Program

Goals

Per AWWA G200-15 Distribution Systems Operation and Management, section 4.2.5, a valve exercising program is to follow AWWA Manual M44 and the manufacturer's recommended procedure and include at least the following elements:

* 1) A goal for the number of transmission valves to be exercised annually based on the percentage of the total valves in the system.
* 2) A goal for the number of distribution valves to be exercised annually.
* 3) A goal that **100%** of the valves are tested within a certain time frame (recommend 1x/5 years).
* 4) Measures to verify that the goals are met and **written** procedures for action if the goals are not attained.
* 5) Critical valves in the distribution system shall be identified for exercising on a regular basis. Potential water quality and isolation concerns shall be recognized. The program shall **track** the annual results and set goals to reduce the percent of inoperable valves.
* 6) The valve-exercising program may be implemented in conjunction with the systematic flushing program.
* 7) A goal of replacing the inoperable valves identified during the operation and maintenance process shall be established as part of the exercising program.

*EPA

Valve Exercising Program

Determining which valves are critical

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* • Areas prone to main breaks
* • Areas of infrastructure approaching the end of its useful life
* • Areas around road or other utility re-construction areas

*EPA Valve Exercising Program

EPA Valve Exercising Program

Frequency of exercising

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  * Rate of deterioration known to occur in the distribution system. Systems should operate a representative sample annually to determine rate of deterioration
  * Consequence of failure or delays in being able to close the valve

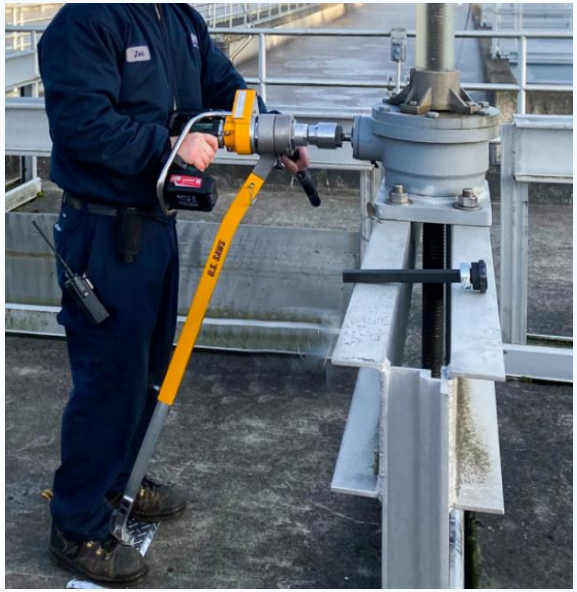
Exercising Extends the life of moving parts for:

Valves

Hydrants

Gates

Pumps



Why exercise a valve

Planning an Exercise Program

What you really need to get started:

The Big Picture

A valve exercising program is more than just a T-handle and spare time.

Very specific tools and resources will need to be allocated to properly implement an exercising program

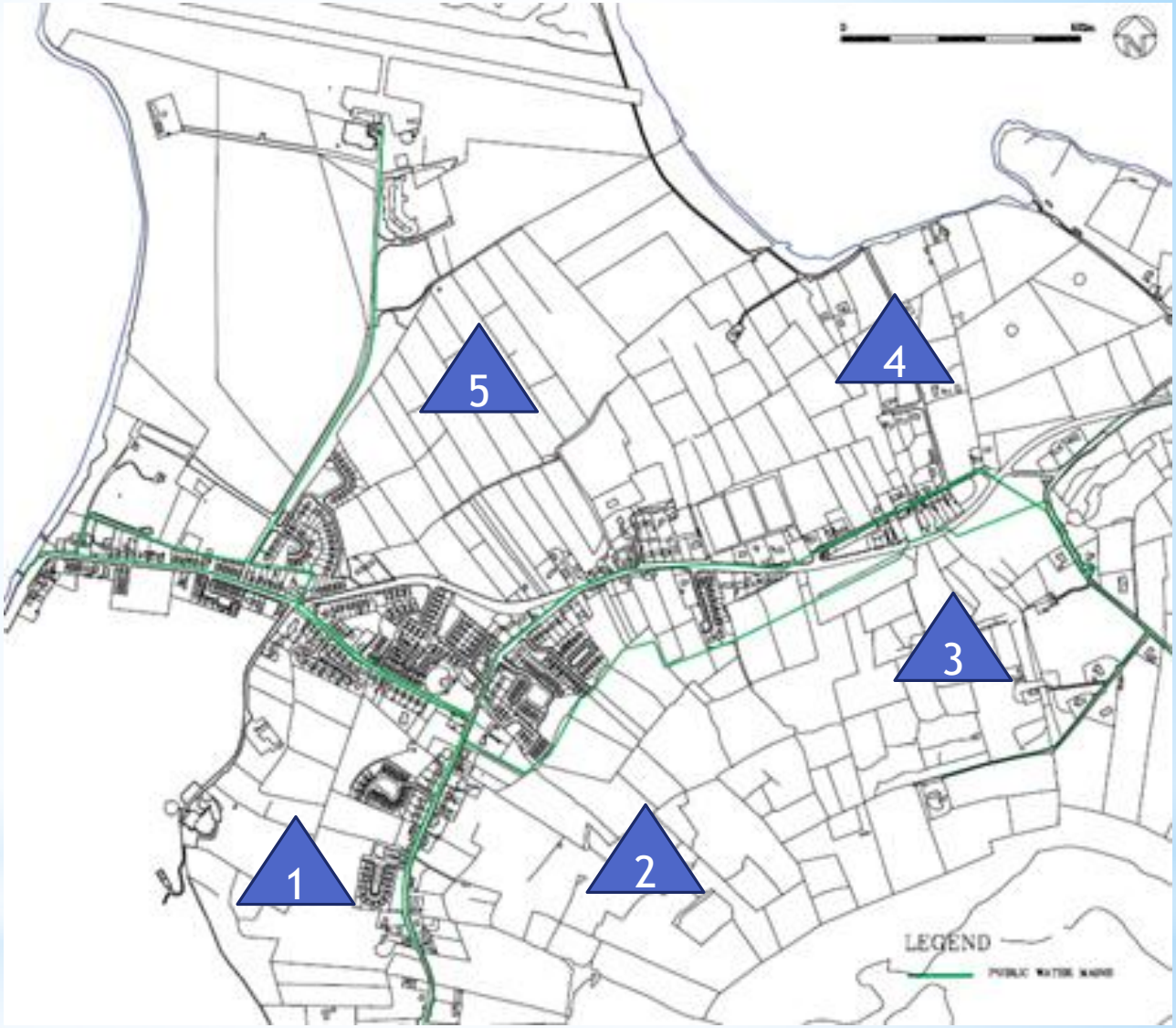
Planning an Exercise Program

* Start Small and Collect the DATA
* Mapping out your system
  * Create Zones
    * Old Meter Read Routes
    * Hydrant Flushing program
    * Snowplow routes
  * Identify Critical vs. Non-Critical
  * Separate non-Critical into 5 zones (years)
* Budgeting
  * Labor needs
  * Tool needs
  * Time Needed

Map Zones

Find Valves

GIS Location



Planning an Exercise Program

*Budgeting

Valves	Critical %	Critical	Valves / Hour	Avg Salary
15,000	15%	2,250	2	40,000

Valve Exercising

Non-Critical Valves	Years	Valves / year	Valves/ hr	FTE	Valve /FTE
12,750	5	4,800	2	2	2,400

1200 hrs / yr

Costs

Employees

Avg Salary	Employees	Annual Salary
45,000	2	90,000

Employees	
Base	40,000
Misc	5,000

Initial Cost

Vehicle	Tools	Crews	Fuel/Misc	Total Cost
35,000	40,000	2	16,144	126,144

Repair Parts	
Parts	250
Labor hrs	1.3
Labor Wage	21.63

Valve Repair Replace

10%	Repair 90%	Material	Labor	Total
480	432	108,000	12,113	120,113

800 hrs / yr

Replace 10%	Material	Labor	Total
48	57,600	5,192	62,792

Valves	
12"	1700
8"	700
avg	1200
Labor hrs	5
Labor Wage	21.63

Planning an Exercise Program

*Budgeting

Annual Costs

Year 1

Upfront Costs	135,304	Valves
Salary	90,000	
Repair	120,113	432
Replace	62,792	48
	408,209	

Year 2

Annual Costs	16,144	
Salary	90,000	Valves
Repair	91,580	329
Replace	47,876	37
	245,600	

Year 3

Annual Costs	16,144	
Salary	90,000	Valves
Repair	69,825	251
Replace	36,503	28
	212,472	

Year 4

Annual Costs	16,144	
Salary	90,000	Valves
Repair	53,238	191
Replace	27,832	21
	187,214	

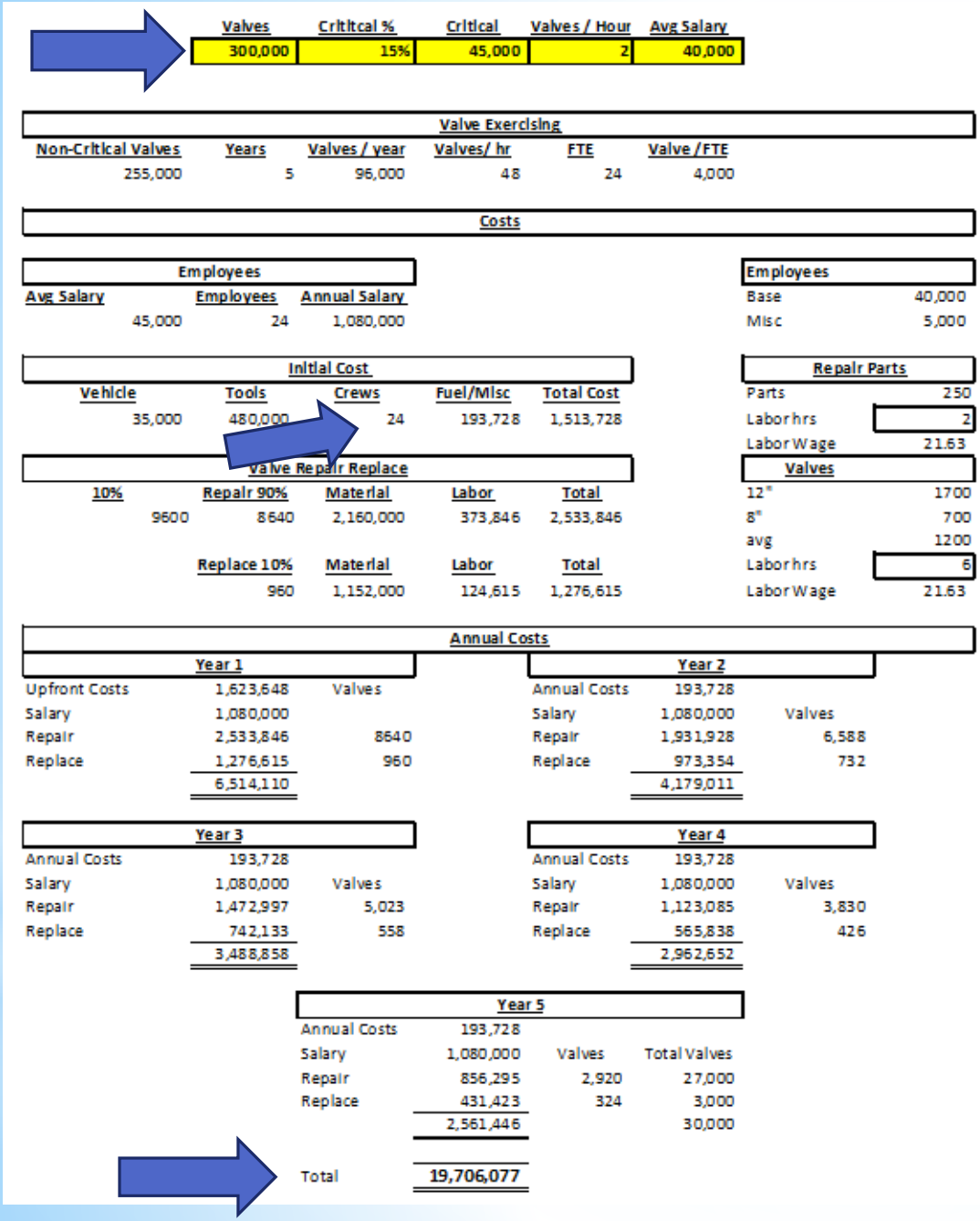
Year 5

Annual Costs	16,144		
Salary	90,000	Valves	Total Valves
Repair	40,591	146	1,350
Replace	21,220	16	150
	167,955		1,500

Total **1,221,450**

Planning an Exercise Program

*Budgeting



Valves	Critical %	Critical	Valves / Hour	Avg Salary
300,000	15%	45,000	2	40,000

Valve Exercising

Non-Critical Valves	Years	Valves / year	Valves/ hr	FTE	Valve /FTE
255,000	5	96,000	48	24	4,000

Costs

Employees

Avg Salary	Employees	Annual Salary
45,000	24	1,080,000

Employees	
Base	40,000
Misc	5,000

Initial Cost

Vehicle	Tools	Crews	Fuel/Misc	Total Cost
35,000	480,000	24	193,728	1,513,728

Repair Parts

Parts	250
Labor hrs	2
Labor Wage	21.63

Valve Repair Replace

10%	Repair 90%	Material	Labor	Total
9600	8640	2,160,000	373,846	2,533,846

	Replace 10%	Material	Labor	Total
	960	1,152,000	124,615	1,276,615

Valves

12"	1700
8"	700
avg	1200
Labor hrs	6
Labor Wage	21.63

Annual Costs

Year 1

Upfront Costs	1,623,648	Valves
Salary	1,080,000	
Repair	2,533,846	8640
Replace	1,276,615	960
	6,514,110	

Year 2

Annual Costs	193,728	
Salary	1,080,000	Valves
Repair	1,931,928	6,588
Replace	973,354	732
	4,179,011	

Year 3

Annual Costs	193,728	
Salary	1,080,000	Valves
Repair	1,472,997	5,023
Replace	742,133	558
	3,488,858	

Year 4

Annual Costs	193,728	
Salary	1,080,000	Valves
Repair	1,123,085	3,830
Replace	565,838	426
	2,962,652	

Year 5

Annual Costs	193,728		
Salary	1,080,000	Valves	Total Valves
Repair	856,295	2,920	27,000
Replace	431,423	324	3,000
	2,561,446		30,000
Total	**19,706,077**		

300,000 Valves

24 Crew Members

Total Cost
$19,706,077

What you really need to get started: The Big Picture

1)Locating equipment to find the riser or lid if buried

2)Riser clean out tools, auger, clean out shovels, vacuum truck, magnets

3)Marking buttons, Maps, layouts, GPS, and methods to document locations and other information

4)Valve key, Valve machine, towable or dedicated truck mounted rig

Tools for Exercise Program

Safer Lifting Methods

-Lessen workload

-Lower risk for Injury

-Easy to remove & Replace

Tools for Exercise Program

cleanout

Location/ Marking

GPS/ Locating

Tools for Exercise Program

Tools for Exercise Program

Manual

Powered

Truck/ Trailer Mount

Tools for Exercise Program

Other Powered Uses

-Gates

-PIV's

-Hydrants

What Counts as an Exercised Valve

* Closing or opening a valve for any reason
  * Did you Turn it and RECORD the data (Date/Time/Operator)
  * Water line Breaks – valves should be turning
  * Hydrant Flushing Crew – Maintenance/Service
  * Tapping for new Services
* Best Practices
  * Begin Slowly at lower torque settings
  * Get at least 5 – 10 turns
  * Reverse (open) for 2 – 3 turns
  * Reverse (close) for 5 – 10 turns
  * Repeat until fully closed
  * Open 2 – 3 turns to flush debris
  * Close and Open full (slowly)
  * Turn back ½ turn from full open

Collecting the Data

* RECORD THE DATA
  * This is most important step
    * Valve ID (#)
    * Coordinates
    * Turns
    * Torque Setting
    * Date
    * Time

	Valve	Coordinates	Turns	Torque	Date	Time
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

* RECORD MUCH MORE DATA
  * Date
  * Employee
  * Asset Number
  * Valve Type
  * Valve Size
  * Original Position
  * Final Position
  * Closes L/R
  * Number of Turns
  * Number of Cycles
  * Torque lbs
  * Sound
  * Conditions
  * GIS

Valve Exercising

BEDFORD Water Department

Street:

Date	Employee(s)	Asset Number	Valve Type	Original Position	Final Position	Closes L/R	Number Turns	Number Cycles	Torque lbs.	Valve Size	Sound	Condition	GIS

NOTES : *(REFER TO ASSET #)*

* Collecting the Data

Can I break a valve stem?

Yes! - Most manufactures publish maximum stem torque. Older systems are at greater risk. Determine your maximum torque values so damage does not occur. (you can choose to have a lower amount than the manufactures values)

Can I break a valve stem in the closed position?

Yes! - Do not slam a valve shut. Slow and steady. With a counting device you should have awareness of the valves cycle position.

Do you have an emergency plan if you cut off the West side of towns water supply?

Questions

How do I get a valve started?

Getting old valves moving depends on several fundamentals that must be understood.

1) Carefully! - Forcing a valve to move that has been frozen for years requires patience. You should expect to open and close the valve in small increments to clear the running surfaces and threads of debris.

2) Slowly! - There is no need to hurry the job. If the valve binds or freezes the torque from an exercising machine can damage a valve stem.

3) Know when to say when! - Over torqueing a frozen valve can lead to permanently damaged parts or a valve stuck in the wrong position. Check with the valve manufacturer for a maximum torque specifications.

CAUTION moving a valve quickly can cause surge and spikes of water hammer that can damage components up and down stream of the valve. An 8" valve should take upward of 30 seconds or more to complete an open or closing cycle.

Questions

* Possible tools needed for Repairs
  * Nut Replace Kits

  * Valve Repair Parts

Questions

* Possible tools needed for Repairs
  * Saws - Air / Hydraulic / Gas
    * Chain / Belly / Chop
      * Safety concerns first
      * Access to Air or Hydraulics vs. Gas

Questions

* Possible tools needed for Repairs
  * Trench Safety
    * Egress – Ladders, Steps, etc.
    * Boxes
      * Rental Offices
      * Neighboring Municipality
      * Personal Portable Units
        * 1 person can set up in 10 – 15

Questions

When	Where	Who	What	Depth
2/17/2020	Licking County, OH	39 year old	Working on Drainage	10 Foot Depth
4/10/2019	New Plymouth, ID	59 year old	Working on Irrigation	7 Foot Depth
4/10/2019	New Plymouth, ID	53 year old	Working on Irrigation	7 Foot Depth
4/8/2019	Marysville OH	34 year old	Working on Culvert	20 Foot Depth
4/6/2019	Sugarcreek TWP	49 year old	Working on Sewer Line	8 Foot Depth
4/2/2019	Spencer, TN	31 year old	WATER LINE LEAK	?

2017 - 2019	46 Trench Related Deaths	
2019	10 Trench Colapse	2 in OH
2018	10 Trench Colapse	
2017	15 Trench Colapse	1 in OH
2013-2017	45 Trench Related Deaths	5 in OH

https://www.osha.gov/fatalities/reports/archive

*Trench Safety

In Conclusion:

Over time a valve maintenance program will help keep moving parts operating efficiently and help to make locating valves easier.

There are many variables in every system, and we hope you have learned a few basics to implement your own program.

Good Luck!

Why exercise a valve

Utility Solutions, Inc.

CHERNE®

Clear Water Manufacturing

Copperhead Industries, LLC

KUPFERLE Since 1857

GPK PRODUCTS, INC.

Hydrant Repair Parts, Inc.

JM Eagle — Building essentials for a better tomorrow™

Oldcastle® Enclosure Solutions

TPS® TOTAL PIPING SOLUTIONS, INC.

U.S.SAWS

WrapidSeal™ Manhole Encapsulation System

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