

CRITICALITY – What to document



When you know better you do better

Maya Angelou

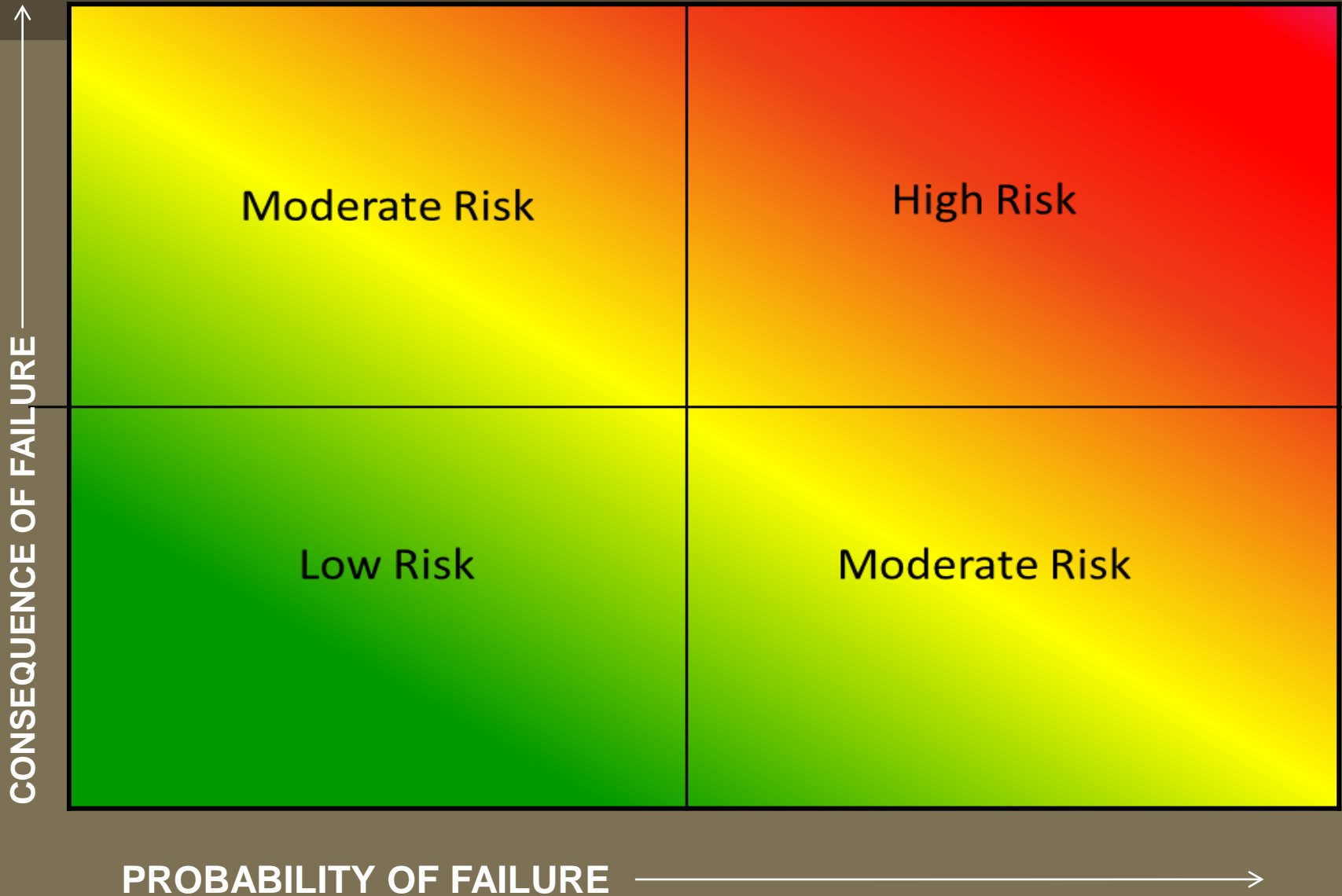


What is the likelihood that an asset will fail?

What is the consequence if the asset does fail?



ASSET RISK



FAILURE MODES

MORTALITY

LEVEL OF
SERVICE

CAPACITY

FINANCIAL
INEFFICIENCY

FAILURE MODES

MORTALITY



FAILURE MODES

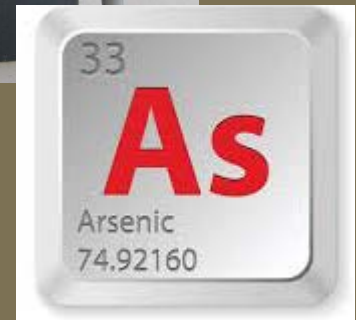
LEVEL OF SERVICE



HAVE 4''



NEED 6''



FAILURE MODES

CAPACITY



FAILURE MODES

FINANCIAL
INEFFICIENCY



More to fix than to
replace



ASSESSING CONSEQUENCES?

FINANCIAL

ENVIRONMENTAL

SOCIAL

CONSIDER THE TRIPLE BOTTOM LINE

CALCULATING CRITICALITY

POF = PROBABILITY OF FAILURE

COF = CONSEQUENCE OF FAILURE

Criticality = POF X COF

Risk Analysis

What information should you track when completing a risk assessment?

FACTORS TO CONSIDER FOR

Age of Well

Condition of Well

Clogging of Well

Aesthetic
Water
Concerns

Depth of
Well

PROBABILITY OF FAILURE

Scores for PoF

Well Name	POF Factor
Westside Well	4
Eastside Well	2
Northside Well	4
Southside Well	1
Central Well	4

FACTORS TO CONSIDER FOR

Cost of
Repair

Number of
Customers
Served

Number of
Critical
Customers

Time of
Repair

Redundancy

CONSEQUENCE OF FAILURE

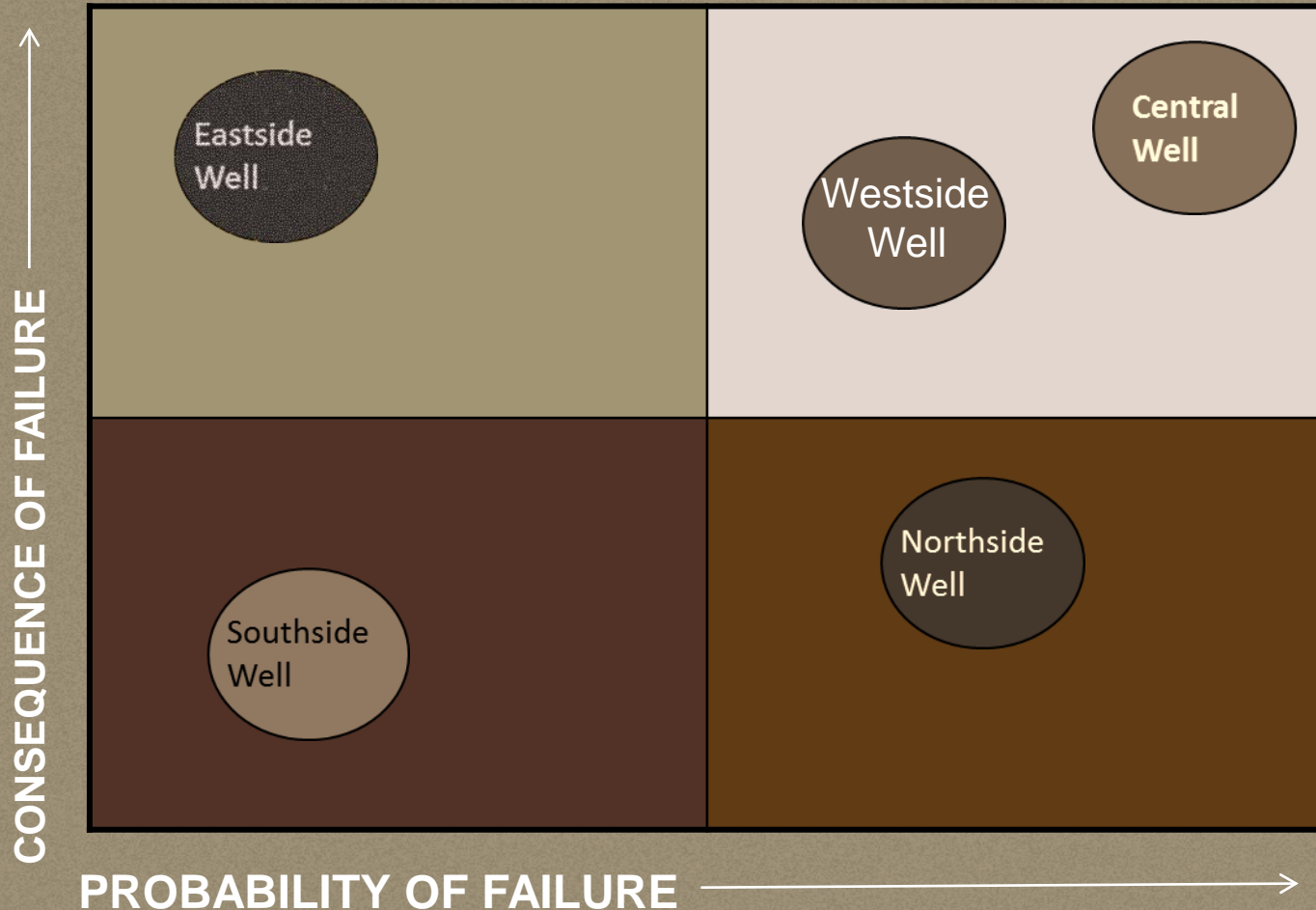
Scores for CoF

Well Name	COF Factor
Westside Well	4
Eastside Well	4
Northside Well	3
Southside Well	2
Central Well	5

Risk Scores for Wells

Well Name	POF	COF	TOTAL RISK SCORE
Westside Well	4	4	16
Eastside Well	2	4	8
Northside Well	4	3	12
Southside Well	1	2	2
Central Well	4	5	20

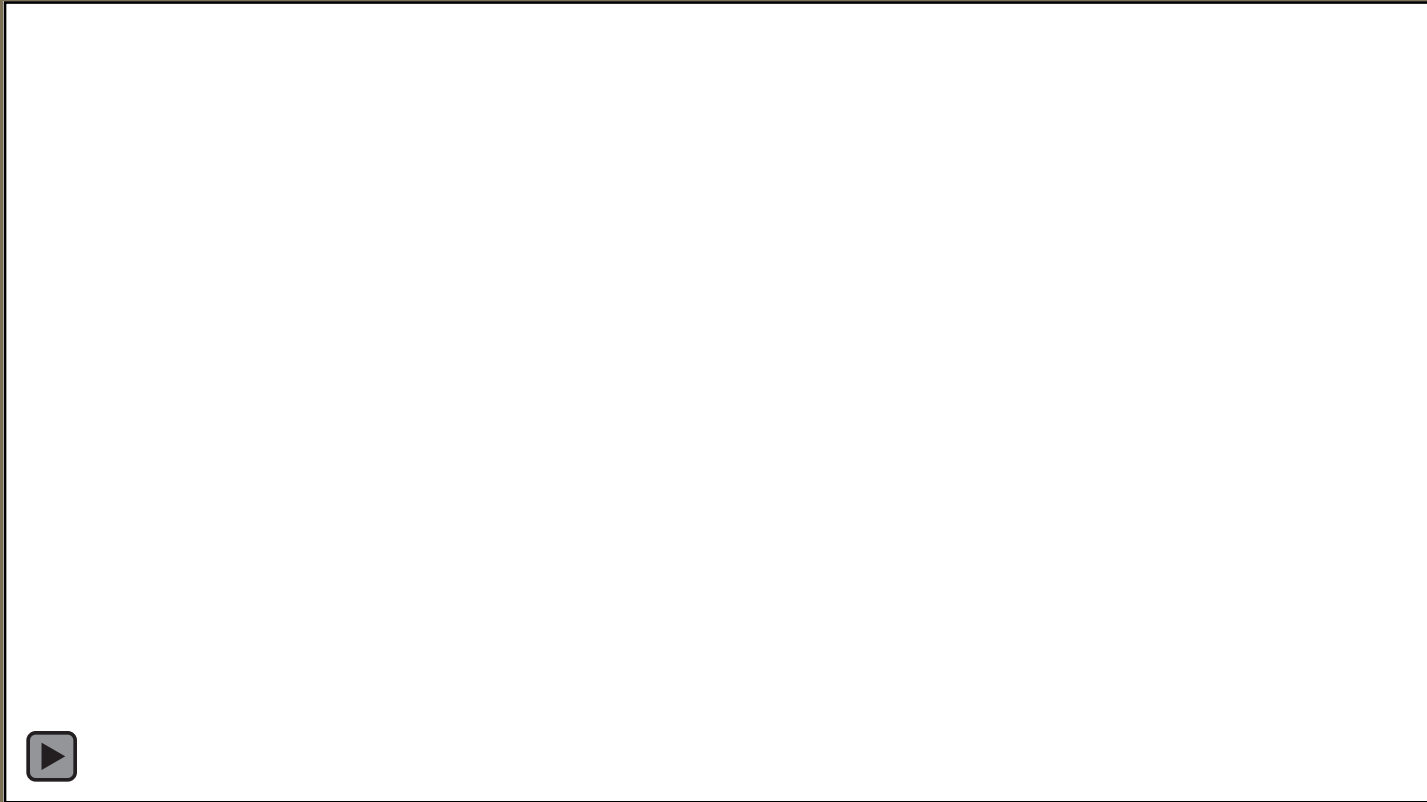
VISUAL DISPLAY OF EXAMPLE DATA



CRITICALITY CHANGES

- ✓ **CRITICALITY IS NOT STATIC**
- ✓ **EACH DAY CRITICALITY CHANGES SLIGHTLY**
- ✓ **NEED TO REASSESS CRITICALITY AT LEAST EVERY YEAR IF NOT SOONER**
- ✓ **REASSESS WHEN MAJOR CHANGES ARE MADE (UPGRADES, REPLACEMENTS, MAJOR CONSTRUCTION, REHABILITATION, REDUNDANCY ADDED)**

CRITICALITY IN ACTION



Frank Roth, ABCWUA, Albuquerque, NM

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 Very Low	2 Low	3 Moderate	4 High	5 Very High		

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

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/>

Life Cycle Costing – What to Document



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Optimizing Life Cycle Costs

What does it cost?



O&M



Rehab

How much life is added or depleted?



Repairs



Replace

Is extending asset life best?

Optimizing Life Cycle Costs

What data or information is needed to make this choice?



O&M



Rehab



Repairs



Replace

Is extending asset life best?

Optimizing Life Cycle Costs



Operate

- Energy Costs
- Water Loss Audit



Maintain

- Maintenance Schedules
- Budgets



Capital Projects

- Repair History
- Replacement Costs

What to Document?

Updated O&M Tool

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



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

Replacement Valuation Tool



Name:

Date:

Utility:

Instructions:
Please input the water system's information in the green boxes. Please input the quantity and, where applicable, the size for each type of asset the utility owns. If the utility has recent unit price information for a specific type of asset listed below, that value can be input in the column labeled "Known Unit Price".

Orange Box: These are the calculated values

Gray Box: Unit Prices

Asset Type	Asset	Size	Quantity	Unit	Low Range Unit Price:	High Range Unit Price:	Median Range Unit Price:	Known Unit Price:	Low Estimated Value	High Estimated Value	Median Value
Pipeline	Ductil Iron Pipe	4"-6"	199744	per Linear Foot	\$ 24.26	\$ 130.00	\$ 42.50		\$ 4,845,789	\$ 25,966,720	\$ 8,489,120
		8"-10"	87268		\$ 33.11	\$ 150.00	\$ 100.50	\$ 2,889,443	\$ 13,090,200	\$ 8,770,434	
		12"-16"	64409		\$ 49.64	\$ 230.00	\$ 90.00	\$ 3,197,263	\$ 14,814,070	\$ 5,796,810	
		18"-24"	155250		\$ 97.59	\$ 320.00	\$ 265.00	\$ 15,150,848	\$ 49,680,000	\$ 41,141,250	
	Main PVC	4"-6"		per Linear Foot							
		8"-12"									
14"-20"											
HDPE			per Linear Foot								
Service Line	.75"-2			Each							
Valves	BlowOff	2"		Each							
	Gate Valve			Each							
	Air Release Valve	1"-2"		Each							
	PRV	4"-8"		Each							
	Check Valve			Each							
Storage	Ground Storage			Gallons							
	Elevated Storage			Gallons							
	Steel Tank			Gallons							
	Concrete Tank			Gallons							
Hydrant	Fire Hydrant	4"-6"		Each							
Meters	Supply Meters	4"-6"		Each	\$ 700.00	\$ 8,000.00	\$ 1,500.00		\$ -	\$ -	\$ -
	Customer Meters	.75"-2"		Each							
Pumps	Submersible Pump	1/2 HP- 30 HP		Each							
	Booster Pump	500 GPM-2000 GPM		Each							
Treatment	Chemical Feed and Storage System			Each							
Estimated Value Range:									\$ 26,083,300	\$ 103,551,000	\$ 64,197,600

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