AWT 2021

Annual Convention & Exposition

SEPTEMBER 22-25, 2021

Rhode Island Convention Center | Providence, Rhode Island

Critical Service & Reporting Criteria Using Site Risk Factors

Introducing the RFI (W.O.E. Relative Risk Factor Index)

Gold Mine Wastewater Treatment Plant – Low or High Risk?

Dirty, Variable Water Quality

Improper Equipment & Controls

Stressed RO Water - Antiscalants

Frequent Power Outages

Discharge to Environment, EPA Limits

Inexperienced, Untrained Staff

➢ Assess: What is the Situation?

- First things, first
- Start with the end in mind
- Good, bad, and the ugly
- Easy or difficult?
- Prone to problems?
- Successful outcomes?
- Low, medium, or high risk?
- Avoid the “I had no idea…”

➢ Create a Relative Score or Rating

- Risk Factor Index (RFI)

What Are Successful Outcomes?

- Prerequisite is to define successful outcomes
- Examples:
  - ✓Meet all safety concerns
  - ✓100% plant production uptime
  - ✓Provide clean heat exchangers
  - ✓No Legionella issues
  - ✓Meet budget guidelines
  - ✓No wastewater compliance exceedances
  - ✓Meet all KPI's
  - ✓Complete all service commitments

Risk Assessment

- A risk assessment can be created for any water treatment system:
  - Boiler
  - Cooling
  - Clarification & Wastewater
  - Membrane Systems
  - Closed Loops
  - Specific Process

Risk & Successful Water Treatment Programs

- Being able to categorize a site's **risk factors** can greatly help to design and predict a successful water treatment program

- Knowing how risky a site is can help in determining things such as:

  - **The required water treatment chemical treatment program**
  - **The service frequency by a service provider**
  - **Type of services required and qualifications of the service engineer**
  - **How to communicate and coordinate efforts most effectively between the service provider and with the end user client**
  - **Improvement opportunities**

W.O.E. Major Risk Factors

- **Three major categories** to consider that will affect the results as being positive and successful, or prone to problems and poor results:

1. Water Quality & Variability
2. Operations & Control
3. Equipment Used & System Design

Risk Assessment Process

The Risk Factor Index (RFI)

- Three digits for a site or process
- Example: RFI = 323
  - High risk water; Medium risk operations; High risk equipment

If desired, an overall system or site risk can be determined

- Based on the 1 – 3 Scale

Risk Assessment Process

- Create a list of factors and assess for each W.O.E. category:
  - A Relative Assessment per category for a given site:
    - 1 for low, 2 for medium, or 3 for high risk.
      - Low Risk (1)
      - Medium Risk (2)
      - High Risk (3)
- A matrix spreadsheet as a tool
- Next, design a water treatment program and communication protocol

Example: RFI of 121 and Overall Site Score of 1.3

Site Name:	
Location:	
System Name:	

RFI	*(W.O.E. Relative Risk Factor Index)*
121	1st Digit is **W**ater; 2nd **O**perations; 3rd **E**quipment
	1 - Low Risk; 2- Moderate Risk; 3 - High Risk

Overall Site Score on 1 to 3 Scale:

	Risk Factor:	**Assigned Number:**
By Site or System	Low	1
	Medium	2
	High	3

Final Score Risk Rating:	Low	<1.5
	Medium	1.5 - 2.5
	High	>2.5

Insert "x" for risk rating for each of the categories"

Cooling System	**Low Risk**	**Medium Risk**	**High Risk**	Score
Water Quality & Variability	x			1
Operations & Control		x		2
Equipment & System Design	x			1
			Average Score	**1.3**

Example: List of Questions for W.O.E. Categories

A. Water Quality & Variability:	W:	1

1. Water source (municipal, ground, surface, recycle). A good and consistent municipal supply is generally low risk.
2. Water quality (calcium, alkalinity, etc.; consistent or variable). Will cycled cooling tower water be highly scale forming or highly corrosive?
3. Is there pH control? If acid is being fed and scale control is dependent on acid, then system is more risky.
4. Effective side stream filtration? If there is a good side-stream muiltimedia filter or other type providing 10 micron removal, then clean systems are easier to attain.
5. Area air quality and tower contamination. If the towers are located near areas of dirty air that contaminates the water, then this creates higher risk.
6. Process contamination potential. Are there processes that could contaminate the cooling tower water and create water treatment issues?
7. Other relevant information?

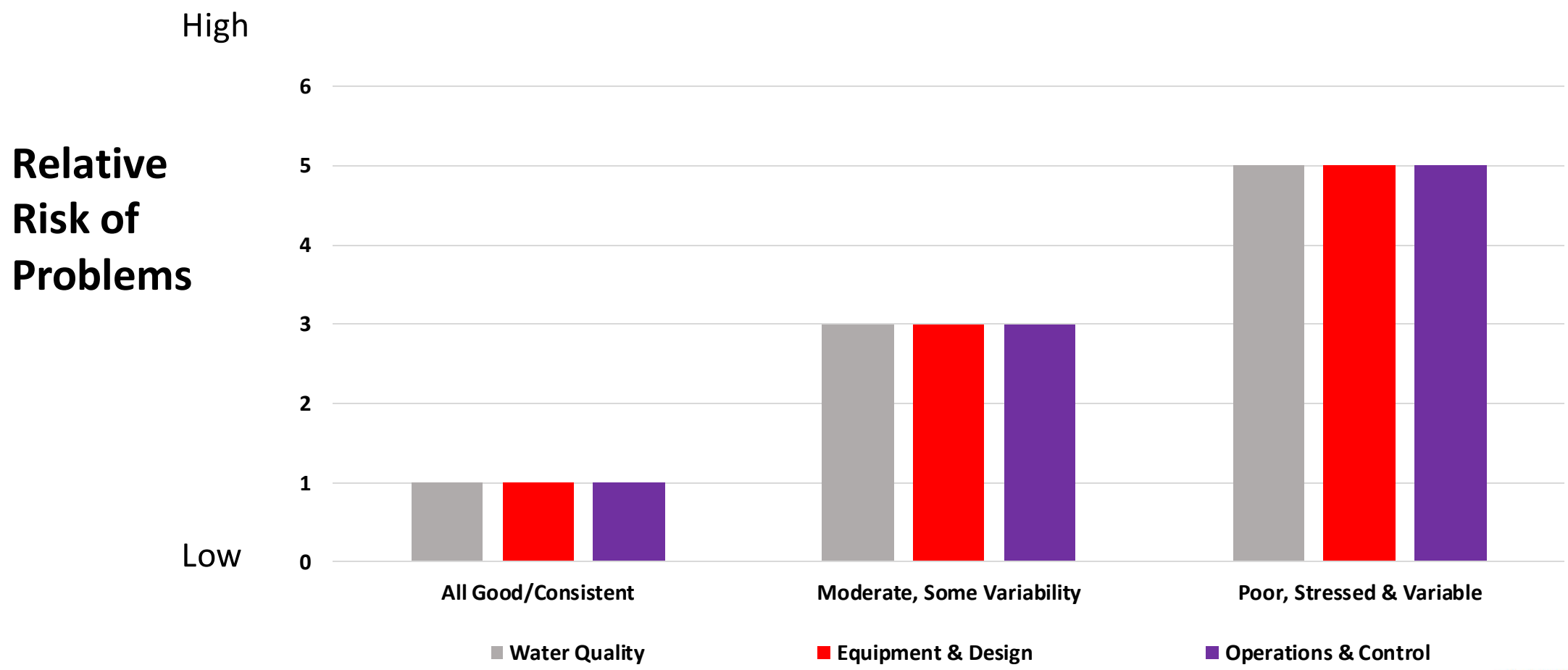
B. Operations & Control:	O:	2

1. Reliability of chemical feed equipment, age, and control consistency.
2. Historical treatment success and results.
3. Ease of access to the site.
4. Relationship with plant personnel.
5. Service frequency requirements to maintain control and effectiveness.
6. Attention by plant personnel, testing, monitoring, adjustments.
7. Biological control history and nutrient loading.
8. Plant bidding process and pressure on program to minimize costs and service. Can adequate chemical treatment and service be applied?
9. Other relevant information?

C. Equipment & System Design:	E:	1

1. HVAC? Other applications with high skin temperatures? (Chillers are generally low risk, but processes such as air compressors increase scale potential and corrosivity).
2. Heat exchanger types & designs: Do chillers have rifled tubes or are there plate and frame exchangers? Both require low TSS and good MB control.
3. Automation (accuracy of cycle control and saturation indices).
4. Condition, age, and reliability of controllers.
5. Condition of the systems (clean and passivated or deposits and corrosion). Dirty and corroded are higher risk.
6. Cooling tower design and condition.
6. Other relevant information?

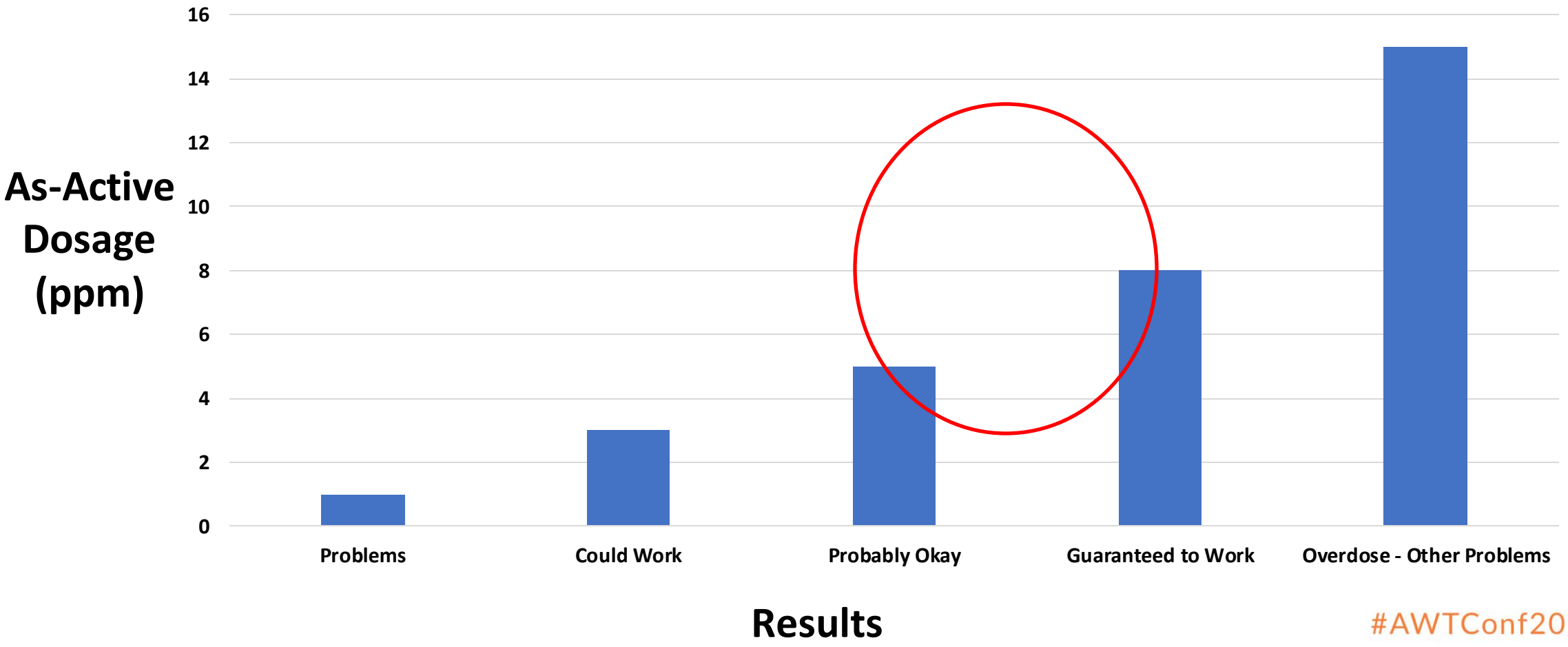
W.O.E. Risks


High
Relative Risk of Problems
Low
6
5
4
3
2
1
0
All Good/Consistent
Moderate, Some Variability
Poor, Stressed & Variable
Water Quality
Equipment & Design
Operations & Control

Value & Strategies

- Risk Factor Index and the use of Plant Risk Matrix formalizes the process of risk management & assessment
- It could lead to a menu of options and strategies
- A site or systems risk factors may change over time
- May be worth having multiple people make the assessment and compare scores
- Helps evaluate service, chemistries, and procedures

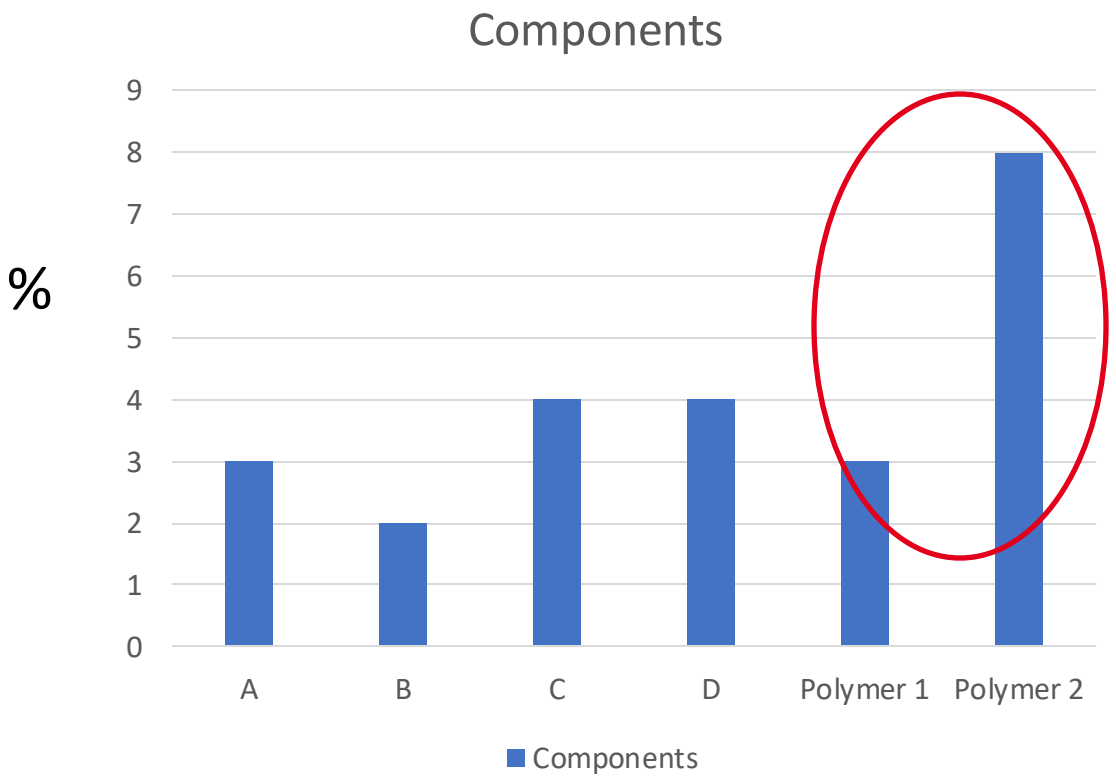
Chemical Dosage vs Risk and Results



Product Selection (Same Products?)

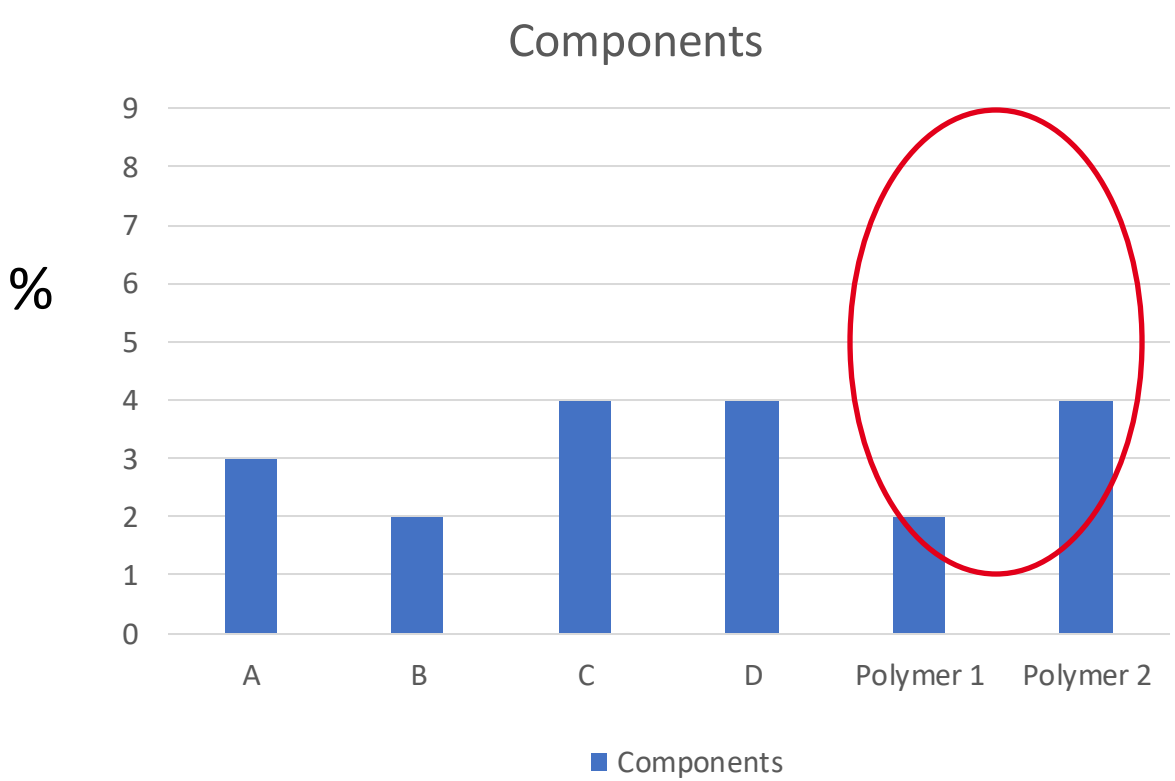
Product X

Robust Product – Stressed Conditions

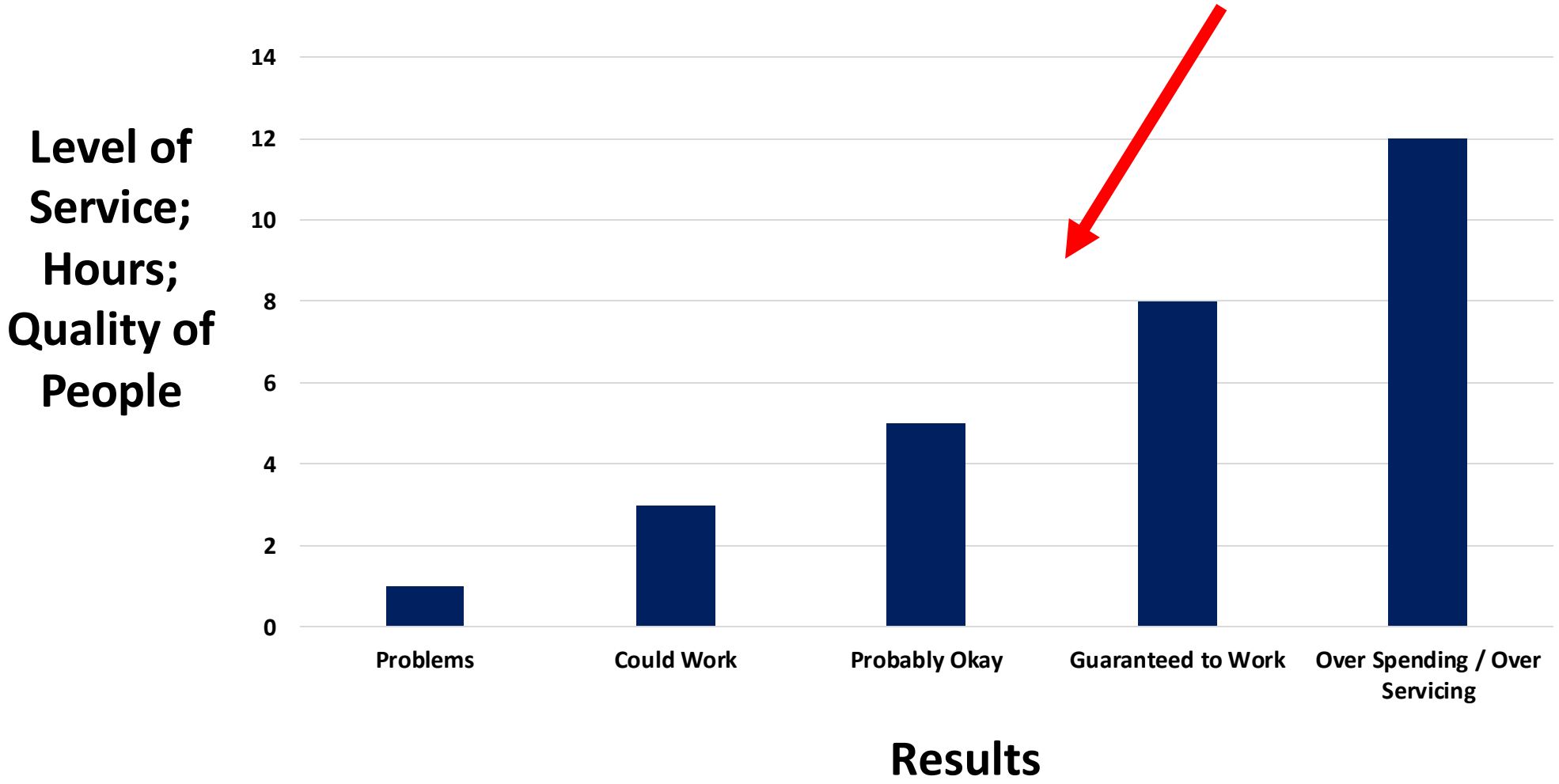


Product Y

Same Actives, but for Low Stress



Service Level vs Risk and Results



Possible Actions

1. Remote monitoring
2. More frequent visits and/or longer visits
3. Better plant control / automation recommendations
4. More or less testing
5. Better polymer selection, higher dosage, broader LSI design, more inhibitors, etc
6. Redundancies / spare parts
7. More training
8. Upset condition procedures in place

Possible Actions

8. Alternative chemistries on site
9. Duel feed systems (primary / trim)
10. Create priorities and project lists
11. More sophisticated testing and more accurate test procedures additional analysis, composite sampling
12. Additional service personnel, backups, higher experience, specific skills, levels of experience
13. Technical reviews by technical department
14. Process contamination considerations

Possible Actions

15. Consideration of temperature extremes
16. Plant politics and cooperation level between shifts and departments
17. Dirty or clean system considerations; is cleaning needed?
18. Safety concerns
19. Plant site history
20. Plant operating schedule, 24/7, other, downtime vs uptime
21. Leave room for unforeseen
22. Available KPI's
23. Set up your “crystal ball” routines

Communications Strategies

1. Remote monitoring and alarms to multiple parties
2. Reports showing KPI of high risk areas
3. Client is made aware of areas of high risk
4. Coordination with plant production, maintenance, purchasing, etc.
5. Quality, etc - More people involved and trained
6. More frequent meetings and reviews
7. Partnership - Cooperation rather than vendor / client

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Try the RFI

What's the Risk?

Thank You